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EME JOURNAL



The EME Journal is the magazine of the Land Electrical and Mechanical Engineers, published at NDHQ under the terms of reference of the Director General Land Engineering and Maintenance and the LEME Branch Adviser. The purpose of the publication is to disseminate professional information among members, and exchange opinions, ideas, experience and personnel news, and promote the identity of the LEME Branch.

The EME Journal depends upon its readers for content. Articles on all aspects of the Electrical and Mechanical Engineering System, photographs, cartoons, people news and comments are solicited. Readers are reminded that the Journal is an unclassified and unofficial source of information. The contents do not necessarily represent official DND policy and are not to be quoted as authority for action.

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CFSEME – What's That?

Or

Finally, our own School!!

by Colonel J.G.G. Nappert

You should know by now that the LEME Branch has its own School – The Canadian Forces School of Electrical and Mechanical Engineering, in short CFSEME. The pre-unification members of the Branch will remark that it sounds like RCEME and the rest of you will likely prefer it because it is not as tongue-twisting as CFSAOE. However, outside our Branch, if you talk about CFSEME you will no doubt face a blank stare. The odd one, like LCol Bob Baxter, will confuse it with the Sapper School (CFSME). You have guessed it, we at CFSEME have an identity problem and count on all LEME members to help us out.

A number of articles in this edition of the EME Journal will explain our organization and facilities. Most of you will be able to relate this information with previous experience as staff or students of CFSAOE. You will

note similarities, but overall there is one big difference – we are now a LEME Branch School. As such, it is to be regarded as the home of all members of the LEME Branch.

A few months before the creation of CFSEME, a search was launched to find an appropriate crest for the School. A number of individuals, including LCol Murata, Maj Porritt, Capt Johnson, WO Fairchild and Sgt Paradis submitted proposals. Some of these were detailed and well researched and thought out. The subject of a crest for CFSEME was one of numerous items debated at the LEME Branch Senate Meeting of October 1985. Two submissions were considered and discussed at length. When the smoke cleared it was decided to adopt the recognized Branch symbol as the centre-piece of the crest. A distinctive motto and the Branch symbol within the standard CFTS frame were all that was

needed to give our School a distinctive crest. The proposed CFSEME crest is shown at Figure 1. It is currently being staffed for approval by Directorate Ceremonial. The selected motto "NOVAM SCIENTIAM QUAERE" or "SEEK NEW KNOWLEDGE" was taken from one of Sgt Paradis' proposals.

The use of the LEME Branch symbol as part of the School crest highlights the fact that we are a Branch School. It is not unique since the MILE, CELE, Medical and Dental Schools also have adopted crests which embody their Branch symbol. You will also see as part of this article two interesting proposals which were considered at the Senate meeting but rejected in favour of the Branch symbol.

Now that you, the members of the LEME Branch, know about CFSEME and its crest, the Branch counts on you to spread the news.



FIGURE 1

The CFSEME Crest is the LEME Branch symbol in a standard frame of the CFTS. The motto "NOVAM SCIENTIAM QUAERE" signifies "SEEK NEW KNOWLEDGE".



FIGURE 2

This proposal was submitted by LCol Murata. The ordnance bomb, spanner and lightning bolt are all recognizable symbols of our past. The motto "VIRTUS SCIENTIA" signifies "STRENGTH THROUGH KNOWLEDGE".



FIGURE 3

This proposal was submitted by Maj R. Porritt. It displays electrons and a gear, symbols of the electrical and mechanical technologies, and the ordnance bomb on the Book of Knowledge.

FULL CIRCLE FOR OUR EME SCHOOL

Capt G.R.C. Emmerson

The number of technicians who remember the RCEME School in Kingston grows smaller every year, yet those who do remember can recount the somewhat emotional and traumatic upheaval that accompanied the move to Borden. The school in Kingston had been the nucleus of the RCEME Corps, and the nest from which RCEME tradesmen had emerged, having learned their craft, loyalties and affiliations; it was home.

There is no doubt the Air technical trades, Air Traffic Controllers and the Firefighters, who were to be part of the new school, felt the same loss. In spite of this, from June 1970 until September 1985, CFSAOE had grown, matured and refined its modus operandi to become the largest technical trades school in the CF. CSAOE had virtually taken over the old RCAF Borden on the south side of the Base. With a staff of over six hundred, housed in sixty-one buildings, it graduated four thousand students each year. During the first few years the Commandant's position had alternated between AERE and LORE, with only one Chief Instructor, always of the other classification. Eventually this became unmanageable as the Commandant was in effect also the CI or "father figure" for his own element at the same time. The School therefore continued with alternating AERE and LORE Commandants, but gained an additional CI so that both sides were always represented at the CI level.

The Air Traffic Controller Company was the first to leave CFSAOE, amalgamating with its civilian counterpart. This left the Air Force trades, LORE and the Firefighters. From time to time the rationale for Firefighter Company (which wears the engineering hat badge) being in CFSAOE came under discussion. As it turned out there were many more advantages

to staying where they were so no change was made. However, if recollections are correct, about 1978 the concept of Aircom having more direct control of training air trades people started being discussed seriously at Air Command Headquarters. Partly as a result of this initiative, the split of CFSAOE into three distinct schools became a reality. They were to be The Canadian Forces Fire Academy (CFFA), The Canadian Forces School of Aerospace Technology and Engineering (CFSATE), and our own, The Canadian Forces School of Electrical and Mechanical Engineering (CFSEME). CFSATE was to leave Training Systems and come under the "wing" of 14 Training Group of Air Command. CFFA and ourselves, CFSEME, were to stay with CFTS.

There was a phenomenal amount of work to be done before and after the split took place. It is not easy to take one school and turn it into three completely separate ones. How, for instance, does an Orderly Room with one set of files instantly split into three, each with a set of files covering the last few years? In some respects the dividing up of real estate was relatively easy. The only significant change to take place in this regard was the moving of CFSATE Headquarters into the Stedman Building, with CFSEME staying in Croil Hall. By and large, CFSATE was pleased to be moving into a slightly newer building, close to the hangar line and the majority of their training. However there were a few comments about the Army taking over the building which was named after Air Vice Marshal Croil. Once CFSATE "Brass" had left Croil Hall our Standards people moved from the old RCAF Headquarters building into the vacant offices. Some were worried about being closer

to the eagle eye of the CI, whilst the two Standards Captains thought it only fitting that they should inherit the old AERE CI's office.

To celebrate this auspicious occasion it was planned to hold a large parade on the ramp between Hangars 7 and 8, comprised of three "Battalions", one for each of the new schools. Dress, of course, was S2s with the LEME Battalion wearing berets, whilst the others wore peaked forage caps. Two practice parades were held on Tuesday 27th and Wednesday 28th August. By the end of the second day everyone was looking good, and on the whole, looking forward to "strutting their stuff" on the Friday. Unfortunately the weather did not cooperate. In fact it rained harder than it had for a very long time during the hours preceding the parade. The venue changed to Hangar 17, but with three Battalions inside there could be no march past. There were two Reviewing Officers, BGen A.C. Brown, Commander CFTS and BGen L.C. Price, Commander 14 Training Group. BGen J.I. Hanson also attended as the Base Commander and a previous CFSAOE Commandant. After the General Salutes both Reviewing Officers inspected the assembled Battalions of CFSAOE. Following this, two signing ceremonies took place. The first was to transfer CFSATE from CFTS to 14 Training Group, thereby changing CFSATE to a lodger unit on the Base. In this instance, all three General Officers signed. The second signing was to appoint the Commandants of the three new schools. Colonel J.G.G. Nappert had the distinction of being the last Commandant of CFSAOE and the first for CFSEME. No office change was required, just School name plates and badges. Each new Commandant then took over command of his School.

FULL CIRCLE FOR OUR EME SCHOOL

At this point, too, CFSATE ceased referring to itself as a Battalion! The ceremonies then quickly drew to an end; the General Officers left and there were light refreshments at the back of the hangar for all spectators and parade personnel.

Bright and early on Monday morning, 2 September 1985, all LEME personnel, students and staff, reported in to their new School to start the long and gradual process of making the new one work as smoothly and efficiently as the old one; or even better, maybe.



Joint Reviewing Officers for CFSAOE school split parade (L-R) BGen L.C. Price and BGen A.C. Brown.



*Transferring CFSATE to 14 Training Group from CFTS (L-R).
Front: BGen L.C. Price, BGen J.I. Hanson,
BGen A.C. Brown
Rear: Col B.E. Swan, Col J.G.G. Nappert,
Maj C. McNeil.*



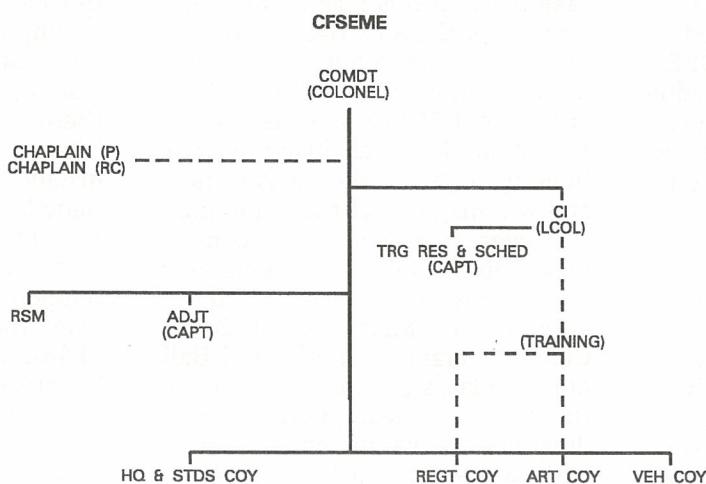
Former Commandants of CFSAOE (L-R) Col (Ret'd) H.E. Holland, 1968-72; Col D.J. Langdon, 1979-82; BGen J.I. Hanson, 1982-85; Col J.G.G. Nappert, Jan-Aug 85.



BGen A.C. Brown and LCol J.A.N. Nault inspect the EME Battalion of CFSAOE.



Accepting their appointments as the new School Commandants (L-R) Col B.E. Swan, Col J.G.G. Nappert, Maj C. McNeil.



STANDARDS

Capt G.R.C. Emmerson

As will be noted elsewhere in the articles on CFSEME, Standards Company were the only ones on the Army side of the house to be uprooted and moved. However, there was a lot more to it than that. The old Standards Company was of course divided into two, with half the staff going to CFSATE and the others to CFSEME. With approximately 12 people it could hardly function any more as a company, so it was combined with Headquarters. Since the initial changes took place, there has been a settling in period, and some refinements to the organization were made during the first few months of 1987. At the risk of causing an almost audible groan from everyone who has attended a few courses, it is necessary to show two organization charts that will better illustrate the changes.

There are only two real changes to be noted on the School Organization Chart. We now have an Adjutant who runs the School Orderly Room and looks after personnel administration, both staff and students. He does not come under HQ and Stds Coy, but reports directly to the Commandant. The new HQ & Stds Coy, commanded by a Major, is made up of two platoons, a LEME Stds Offr for Regt Coy, and a very small administrative staff. The Word Processing Centre (WPC) now comes under the Adjutant and the Library comes under the Training Resources Officer, who in turn now reports directly to the CI. The old Standards side of the house is divided into two distinct platoons with separate functions, which are nonetheless inter-related. There is the Training Evaluation Platoon commanded by a Training Development Officer (Captain). They look after all aspects of evaluation, whether it be administering performance checks or monitoring classes to ensure the necessary standard is being achieved. The Trades Design Platoon, commanded by a LEME Captain, is basically responsible for

the researching, writing, and amending of the Course Training Plans (CTPs).

The specifics of the Evaluation Platoon role will be dealt with separately by its Platoon Commander, so the rest of this article will confine itself to the Trades Design Platoon and what its members consider of interest to our trades people. All too often in past years there has been a feeling that "Standards" tended to be a group of "out of touch" people who got in the way of the real teaching of tradespeople. While this assessment may have been rather unfair, there had to at least have been some element of truth in it or the rumour would never have started. Hopefully, readers will see that aside from the odd "glitch" which will always happen, there is no basis for the old rumour now. More often than not communication, or lack of it, can be shown as a contributing factor in almost all such problems. Therefore an effort has been made by the trades writers to improve communications and working relationships between Standards, the instructor, students, field unit employers, and TSHQ and NDHQ staffs.

The actual lesson of instruction which every student goes through was arrived at by a long and involved process geared to ensuring the right subject matter is taught to the right people at the right time. First, an Occupation Specification (OS) is written at NDHQ by DMOS. This details the required tasks a tradesperson must be able to perform and at what level in order to be a qualified technician doing his job in a unit. After this has been done, TSHQ convenes a Course Training Standard (CTS) Board made up primarily of senior tradesmen drawn from Commands, units, and the School. The CTS will specify exactly to what level/standard the tradesperson must be taught in order to become qualified to do the jobs detailed in the OS. Now the

Trades Design Platoon writers really start to earn their pay. Usually they are members of the CTS Board so they already have a good idea of what's in store for them. They must now write the Course Training Plan (CTP), which will lay out for the Training Companies and the instructors exactly what must be taught at every step, with what references and what training aids. They will often read many, many publications, both civilian and military, trying to find the best and most pertinent references. They must ensure that all the past references are still viable and that they cross-check with the Performance Objectives (POs) and Enabling Objectives (EOs). For every paragraph a student reads in a reference, the Trades Design Writer has probably read ten. As a rough rule of thumb, it will take three days to write new material which will be taught in one day. Once the CTP is written (often with the close liaison and help of the instructors), it is authorized by the Comdt and issued to the Training Company. Sometimes the instructors will find problems with a new PO, or the equipment will change, or parts are modified, etc. This is when very close communication between instructors and writers is most important. The tendency now within Trades Design Platoon is to lean towards forming mini-writing boards for CTP writing, using instructors as well as writers. This should help produce a more complete and accurate document the first time, without the need for later amendments. In cases of equipment modifications or changes, it is often the instructor who has already gained the most hands-on experience, so his expertise and input are very important.

The present time frame is undoubtedly one of the busiest ever for the writers. There have been so many new equipments introduced lately, major modifications, and trade restructuring that

new CTS Boards have sat for most career courses and trades, which in turn means writing new CTPs for all of them. However, as the workload of the Trades Design Platoon is not of real interest to the outside reader, suffice it to say the workload is planned for at least the next two years, and pass on to something more interesting.

Each of the MWOs/WOs who is the writer for a particular trade was asked what had happened lately that was considered of general interest to tradesmen. Here are some of the points.

411 VEH TECH

As a result of the recent 411 CTS Board, many changes were recommended in course length and content. The CTS has not received final approval yet, but the following are present recommendations: QL3 course increased from 114 days to approximately 144 days, including 19 days Common LEME Training. The increase was needed primarily for increases in mathematics, small engines, troubleshooting, electronics, and arc welding. The QL5 course would increase from 106 days to 122 days (10 days Common LEME Training) for more training in electronics, hydraulics, arc welding, air conditioning, troubleshooting, and expedient repairs. A new QL6A is planned which would be a pre-requisite to Sgt and be approximately 55 days long, 15 of which would be Common LEME Training. This course should be the last "hands-on tech trg" level and consist mainly of in-depth troubleshooting, more expedient repairs, power hydraulics, technical writing and deployment of EME units to the field. The QL6B course will be phased out when both the new QL6A and QL7 are introduced. Finally, the new QL7 is a 36-day Common LEME qualifying course from WO to MWO. It covers areas such as tech writing, control officer functions, OSMER process, and operating maintenance command posts. The pilot

course started in March 1987.

421 WPNS TECHS

The same increases in LEME Common Training as shown for the Veh Techs will apply to all trades. The first course on SARP weapons was run in the latter part of 1985 for the benefit of the instructors and it afforded the first opportunity to try out the instructional package. The new weapons were introduced at QL3 and QL5 in 1986. The C6 is now taught at QL3 and QL5 too because its role has increased to include the infantry. The AVGP OSQ has been absorbed into the QL3 and QL5. There will be no more machining at the QL5 level because this function is now adequately covered by the new 441 Mat Tech. With all the propane equipment in the field, training should have started on it. However, a lack of training aids and taskings from DLES and DIT have delayed it. Finally, the life preserver unit, as worn when swimming vehicles and when airborne personnel are dropping near water, has been added to the list of equipments the Wpns Tech looks after. The PO check on this one includes jumping into the swimming pool and then inflating it! Definitely incentive to get it right the first time. Latest word is that the Mat Techs may take over this PO.

430 SERIES FCS TECHS

Since 1985 we have seen the introduction of two major new pieces of equipment. One is the Military Portable Artillery Computer (MILIPAC), with the first course being run 28 Oct to 6 Dec 85. The training involved a precision soldering package, introduction to the FLUKE 9010A Microsystems Troubleshooter, the AM/UGC-74 A(v)3 Teletypewriter and the MILIPAC unit itself. The second piece of equipment is the change to the TOW 2 configuration. In essence, this is now a new weapon system electronically, moving from the analog to the

digital world and incorporating a thermal night sight with missile tracking capabilities. Along with the retrofit system, CFSEME gained two additional complete TOW 2 systems for training.

441 MAT TECH

In a manner of speaking, everything to do with this trade is of interest still because it is so new, but there are a few points which stand out. New technology includes the repair of unibody constructed vehicles using a precision measuring/pulling bench system, the entry into basic composite materials, and armour plate welding. The welding will include all construction metals in the APC, AVGP, M109 and Leopard family. At the end of this training, the successful student will be qualified to the level of a "Master Welder". The advanced machining package should also appeal to many. It is qualifications like these that will move the tradesman from the "Jack of All Trades" to the "Master of Many".

921 AMMO TECH

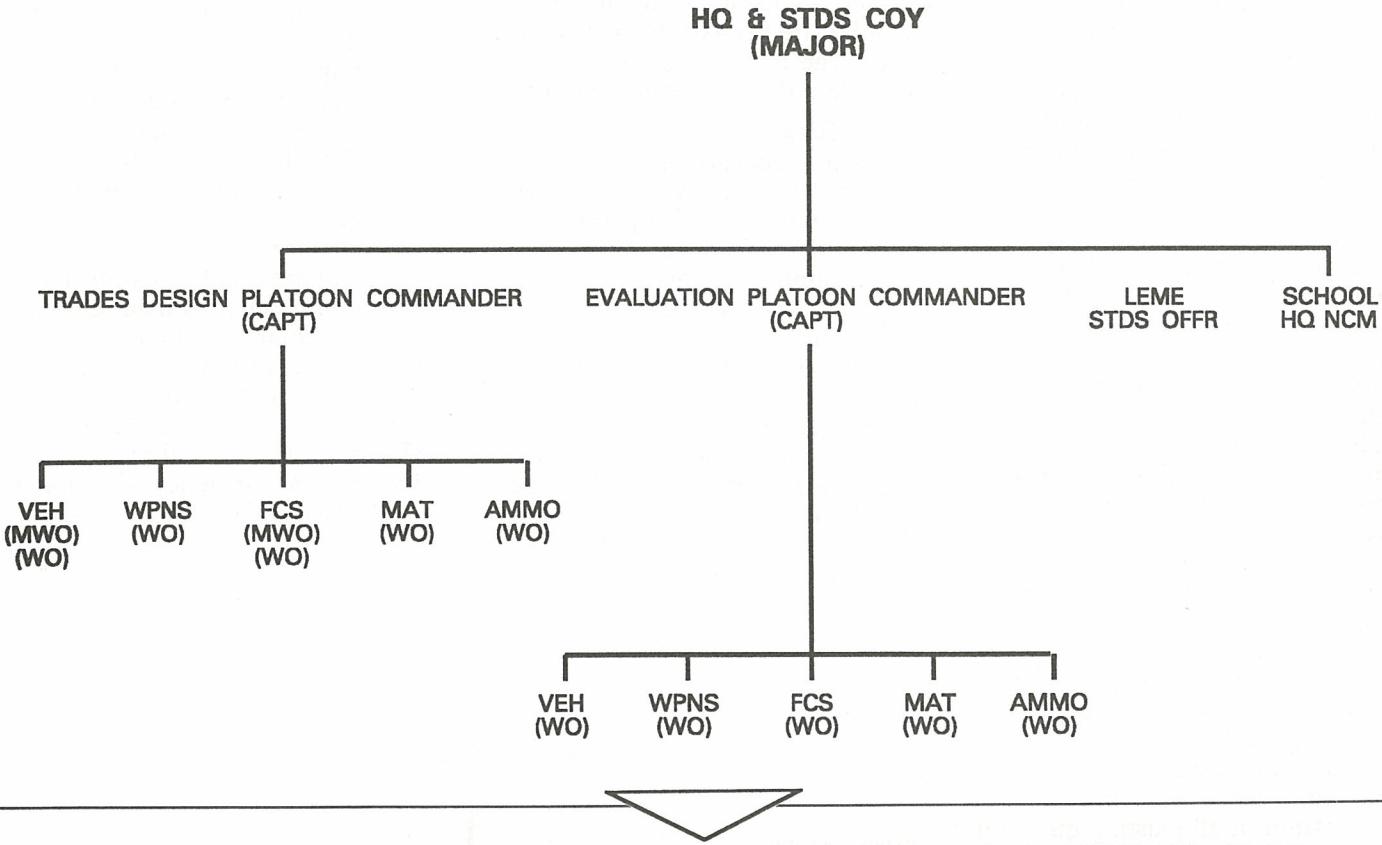
No, it isn't a mistake. Remember that the orphans of the Logistics Branch come under the wing of CFSEME because the nature of their employment is closer to engineering than it is to sorting socks. There are two 921 Ammo Techs in Standards, one in Evaluation P1 and the other in Design P1. These two stalwarts are continually dealing with things of interest, but from their perspective changes of interest are yet to come. There is a possibility of setting up OSQs, one for sea element ammo and one for guided missiles. In the meantime, the QL6B has been cut back by 8 days and the QL5 increased by the same amount. A 3K Transportation of Dangerous Goods package has been added to the QL5. Of more general interest to any trade is the fact that the 921 QL6A is a 6-month home assignment, with exam and course report at the

STANDARDS

end. In some respects this may be likened to the OJT of the 400 trades, but with the assurance that the subject matter has been covered properly and to a common verified standard.

Some of the foregoing points

may be a slight duplication of other articles by the training companies, but when there is such an overlap in trade interest and responsibility between Standards and training cells, it is hopefully understandable.



CFSEME EVALUATION PLATOON

Capt E. Ronsyn TDO

Training conducted within CFSEME, one of the larger schools in the CF, is an important and costly process as huge amounts of money, time and manpower are expended each year conducting training for the LEME classification and trades. It is, therefore, the prime responsibility of the Evaluation Platoon personnel to ensure

the effectiveness and efficiency of all training conducted at CFSEME. In this way the CF is provided with highly qualified personnel at minimum cost, thus improving the overall operational effectiveness of the CF.

CFP 9000(1) specifically defines EVALUATION as the "process by which training effectiveness and

efficiency are measured in order to monitor and improve the DESIGN and CONDUCT of training". Within the CF Individual Training System two types of evaluation take place:

- a. student evaluation which measures whether or not the students have achieved the required standards through

CFSEME EVALUATION PLATOON

written and practical performance checks; and

b. instructional evaluation which measures how efficiently the students have been trained to the required standard through performance check records, student course critiques, instructor lesson plans, staff observations, class and course reviews.

With evaluation thus defined, the aim of this article is to discuss the current activities and future plans of CFSEME's Evaluation Platoon.

The six-member Evaluation Platoon consists of one Training Development Officer and five NCOs, one for each trade. In order to perform their job properly an atmosphere of close co-operation and open communication must exist between the designers, instructors and evaluators. This ensures the proper training of a student to the standards required by the operational units.

Since the reorganization of the School in Aug 85, the evaluation personnel have been primarily concerned with the improvement of student evaluation through the development of a "Centralized Examination System". This required a reorganization and verification of all existing question and examination banks, as well as the refinement of the administration, marking and analysis procedures. The results of dedicated work by both the evaluators and the instructors have been a centrally controlled question and examination bank, with computer marking and statistical analysis of completed examinations. The evaluators are now able to make sound and verifiable judgements on the validity and reliability of questions, examinations and the trends and problem areas.

Student evaluation has been one main focus of the evaluators during the past twelve months; the other focal point has been the assistance given to Course Design

in the development of CTPs. The area of Instructional Evaluation has been limited to a redesign of the student course critique format and SOPs. The revised critique was implemented in mid-March 87.

Some preliminary work was also completed with the development of a comprehensive instructional monitoring program, and will be the primary focus later this year. The monitoring program will include a detailed evaluation of:

- a. course content;
- b. time allocation;
- c. instructional methodologies;
- d. instructor lesson plans;
- e. training literature;
- f. training aids; and
- g. training facilities.

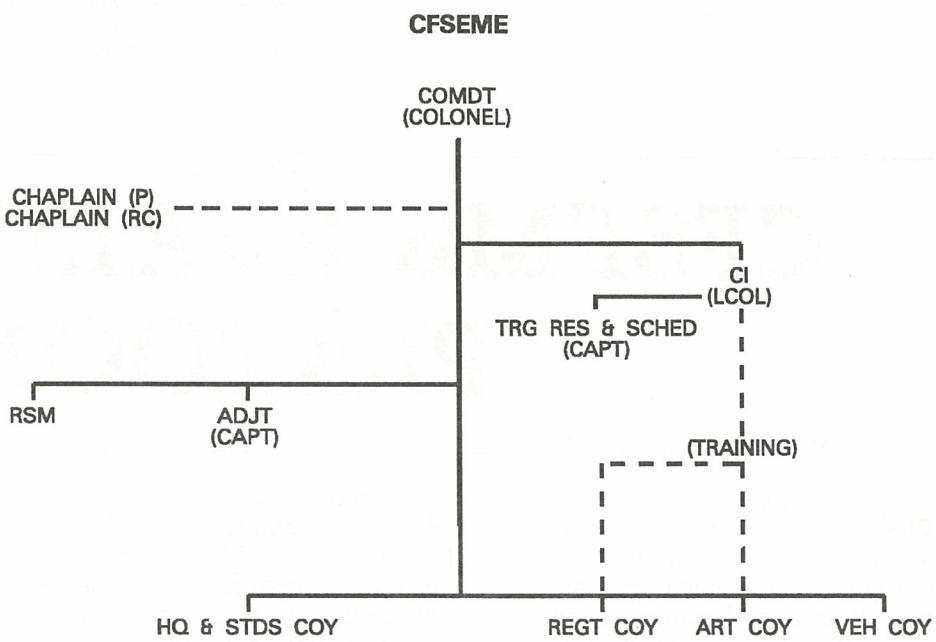
The monitoring of instructional techniques, however, is the responsibility of the instructional supervisor, who is required to monitor individual instructors at least once every six months. The standards evaluator may assist in the monitoring of instructors, but this is only done at the request of,

and in close co-operation with, the instructional supervisor.

In the future, other areas which the Evaluation Platoon will be focussing on are:

- a. annual course reviews;
- b. an annual update of question and examination banks;
- c. the development of a training aids evaluation program directed towards the overall improvement of existing training aid quality; and
- d. the re-introduction of the checklist as the only appropriate means to evaluate a practical exam (vis-à-vis the written PC).

The Standards Evaluation Platoon is the School's main quality control resource and considered to be the troubleshooters or problem solvers. By continuously collecting, analyzing and interpreting feedback data, the overall effectiveness and efficiency of training conducted at CFSEME are ensured.



REGIMENTAL COMPANY

By Major J.L.J.M. Gladu

INTRODUCTION

Welcome to Regimental Company. Over the next few paragraphs it is my hope to give an overview of the major changes that occurred in the Company during the last few years and outline some of the changes that are forthcoming.

LEME OFFICER TRAINING

In Oct 85 a CTS Writing Board was chaired by LCol Lydon and a new and very comprehensive CTS for LEME Officer Basic Course, LEME Advanced and the Mobilization trade specifications for both field and static employment were produced.

The biggest impact of this initiative was made on the LEME Basic Officer CTS. The board ensured that all classification specifications were fully met. To that end the standard of each of the Performance Objectives (POs) were validated. The new POs were created to introduce new technologies or new materiel, and each PO will now be completed within a Phase of Training. The biggest impact was made when micro-electronics training was included in Phase III.

Phase II remains primarily tactical in nature, and the aim is to see if the student can lead a Maintenance Platoon in the field. A serious attempt is being made to reduce the length of Phase II by one week to permit the CMC students some leave during the summer.

Phase III would also be reduced by one week and remains primarily responsible for teaching the technological and engineering aspects of military equipment. In order to concentrate all technical subjects into Phase III, the management portion has been moved to Phase IV. The Company has also undertaken the teaching of electronics and, over the next few years, will become capable of teaching the radio/radar portion of the course in-house. The highlight of Phase III remains Ex Dirty

Hands where students are assessed in both leadership and technical roles.

The aim of Phase IV remains the same, to produce a LEME Lieutenant who can be employed as an Administration Officer, a Control Officer, a Training Officer, and most importantly, a Maintenance Platoon Commander at First or Second Line in the field or on a Base. Phase IV is now conducted only in the Fall, and all students are confronted with a heavy workload of approximately four hours per evening.

Leadership continues to be assessed throughout all Phases of training and there will now be a 12-hour package on leadership theory during Phase II.

The major impact on Regimental Company and Base resources has been the dramatic increase in our student population. The plan for the Training Year 86/87 is to have in excess of 40 students going through each Phase of training, and this is forecasted for the foreseeable future.

Regimental Company does not claim to produce perfect LEME Lieutenants, but the staff are confident that they are reasonably prepared for their first employment with minimum supervision.

OTHER RANKS COMMON TRAINING

Regimental Company retained the responsibility to provide common training for all LEME trades. To that effect, a TQ3 course of 12 days duration, a 2½ day LOMMIS package at TQ5 level, and a 14 day TQ6B package are taught.

A CTS Writing Board was chaired by Major Boisvert in Nov 85 and the staff of Headquarters and Standards Company are now in the process of creating CTPs. The major impact on us will be the creation of a TQ7 course which would replace the current TQ6B Common training. The design of this course is in progress and the pilot course could be run

in 1986.

The major impact over the years on Regimental Company has been the increase in student population and the addition of new courses. Our TQ3 training faculty should be at full strength as of 1 Apr 86 and will include 1 x Capt, 1 x MWO, 1 x Sgt Veh Tech, 3 x MCpl FCS, Wpns and Mat Tech, and 1 x MCpl Sup Tech. A similar initiative is under way to increase the officer instructor cadre by 2 x Capt. This would alleviate the requirement for incremental staff throughout the year.

CONCLUSION

Our mandate for 86/87 remains the same for the range of training offered at the Company, but the student population is on the increase.

Regimental Company remains a small organization with a large mandate.

ARTE ET MARTE

AN OVERVIEW OF VEHICLE COMPANY

by Major J.E.D. Turbide

HISTORIC

Vehicle Company was born in Kingston, Ontario as part of the Royal Canadian Electrical and Mechanical Engineering School (RCEME). In 1971, it moved to Borden, under the direction of Major Jerry Pothier, to be part of the Canadian Forces School of Aerospace and Ordnance Engineering (CFSAOE). On 1 September 1985, the Company became part of the new Canadian Forces School of Electrical and Mechanical Engineering (CFSEME).

ORGANIZATION

Vehicle Company was internally re-organized on 3 September 1985 to meet the Veh Tech 411 training challenge, taking into consideration the following factors:

- a. the maximum establishment of three officers and 83 NCOs;
- b. the spread of the organization in ten buildings;
- c. the specific training of all phases of the Veh Tech trade including TSQs, Militia and Cadets;
- d. the training in French and English for TQ5 and Militia; and
- e. the lack of office and floor space in some buildings.

In order to effectively match the demanding task, the company was divided into three main elements as follows:

- a. a small HQ assisted by a training resources cell to form a HQ and Support Platoon; and
- b. two Pls each commanded by an officer with a MWO as 2 i/c.

HQ and Sp Pl is composed of the OC, the CWO who is the Senior Technical Instructor (STI), the CSM and the Training Resources cell. The two main platoons have the same basic organization. Each one is divided into three sections led by a WO.

Each section is sub-divided into training cells to carry out generically grouped trade subjects.
*(Maybe an organization chart would be appropriate here).

MAJOR RESPONSIBILITIES

Vehicle Company is tasked to conduct Vehicle Technician training for the Canadian Forces. This training covers all facets of the trade incorporating:

- a. Vehicle Technician 411 Trade Qualification 3, English only;
- b. Vehicle Technician 411 Trade Qualification 5, English and French;
- c. Vehicle Technician 411 Trade Qualification 6B, English only;
- d. Engineering Equipment Maintenance (EEM) TSQ 411.02, English only;
- e. M109 Howitzer and M578 Recovery TSQ 411.07, English only;
- f. Aircraft and Airfield Ground Support Equipment Maintenance (AAGSE) TSQ 411.11;
- g. Leopard Maintenance and Recovery TSQ 411.01, English only;
- h. LEME Officer Phase 3, English only;
- j. Vehicle Technician Militia Trade Qualification 1 and 2, English and French; and
- k. Cadet Automotive Familiarization, English only.

Each course can be loaded with a maximum of twelve students. During the year the Company can instruct 12 TQ3, 19 TQ5, four TQ6B, four Leopard Maintenance and Recovery, two M109 Maintenance and M578 Recovery, plus a few EEM and AAGSE courses. Twice a year the Company supports the LEME Officer Phase 3 training, supplying 26 officers and NCOs for a week in the field, plus some technical instruction in class for 12 days. In

all, the Company trains approximately 600 students per year in eleven different cells throughout ten buildings.

NEW CONSTRUCTION

Since the Company moved to Borden in 1971, new building construction has been a very involved and exasperating subject. Maj Pothier had Hangars H-7, H-10, H-18 and Building A-179 for classrooms, training areas and staff offices. In the intervening years, H-6, buildings A-34, A-81, A-146, A-165 and A-218 were added. Nevertheless, the increase in training and the addition of new fleet vehicles in the Forces has again created a lack of offices and training space. Also, since the beginning H-18 has been loaned to Vehicle Company by the air side of CFSAOE, now CFSATE. In order to vacate H-18 new accommodation has to be built as a replacement. In 1979 the requirement for a new building was identified for the first time. For the next three years the study was reviewed and updated as new needs arose. In 1982 the first accommodation study was written. It was also reviewed and updated in April and September of 1983 to meet new course lengths, new TSQs and other updating of the trade. In July 1984 the first draft of the SOR was written. The new trade requirements were identified and finalized on 27 September 1984. As a result, the SOR was updated and submitted for review in May 1985. Then, the move of ETFC St. Jean to Borden, plus more new trade requirements and uncertainties over the length of the TQ3, TQ5 and TQ6B courses forced a new review of the whole requirement. On 7 November 1985 a new SOR had been proposed, catering to the known needs, but without

AN OVERVIEW OF VEHICLE COMPANY

including the move of ETFC or the new course lengths. In January 1986 TSHQ requested another SOR, taking into consideration the move of ETFC and the new course lengths which are 133 days for TQ3, 126 days for TQ5, and 39 days for TQ6A, with no change for TQ6B. The study was to be ready by 1 April 1986. So far the construction is still scheduled for Jul/Aug 1989.

CONCLUSION

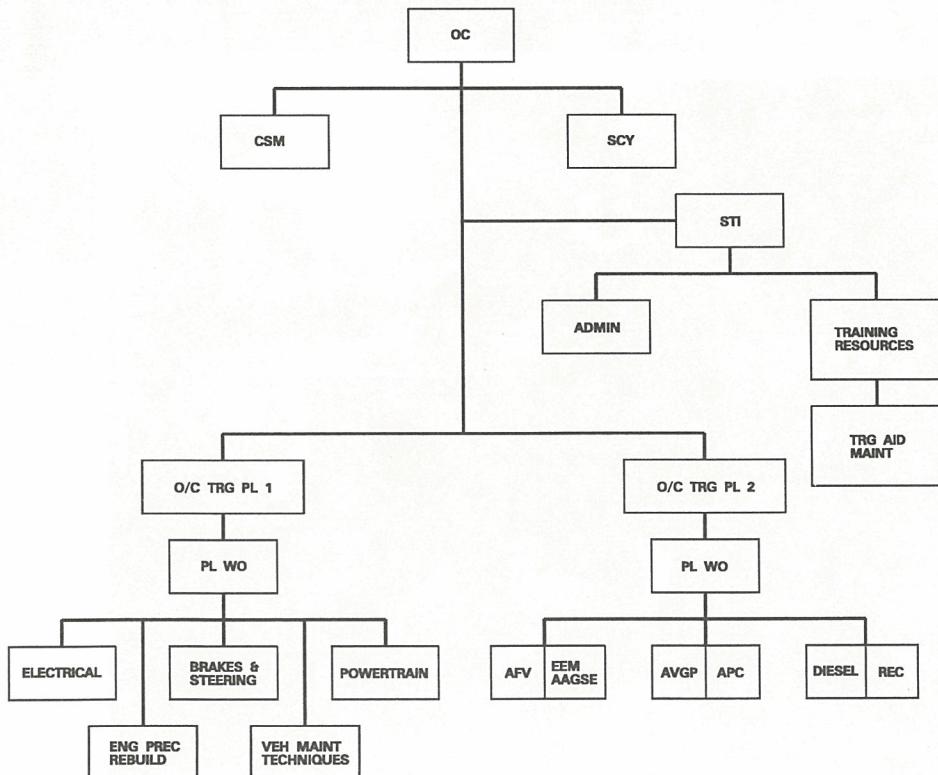
Vehicle Company has watched the passing of two schools and faced about five reorganizations, including four OCs in just the last couple of years. It is interesting to note that the Company was the first command of Maj Pothier, who had as one of his subordinates the present OC, also enjoying his first command in the Company. Nevertheless, in spite of

its trials and tribulations, Vehicle Company is functioning at plant capacity and still maintains its vitality and health.

The short articles and photographs which follow have been put together by the training cells and will give a little more in depth news.



VEHICLE COMPANY

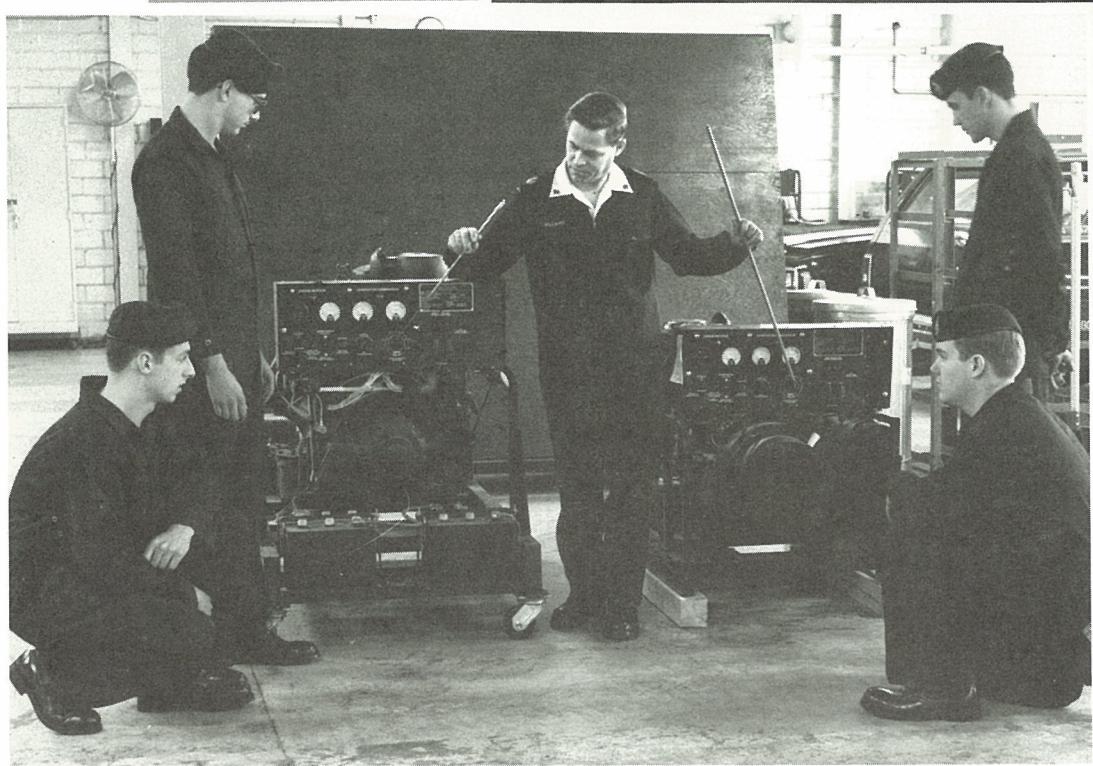
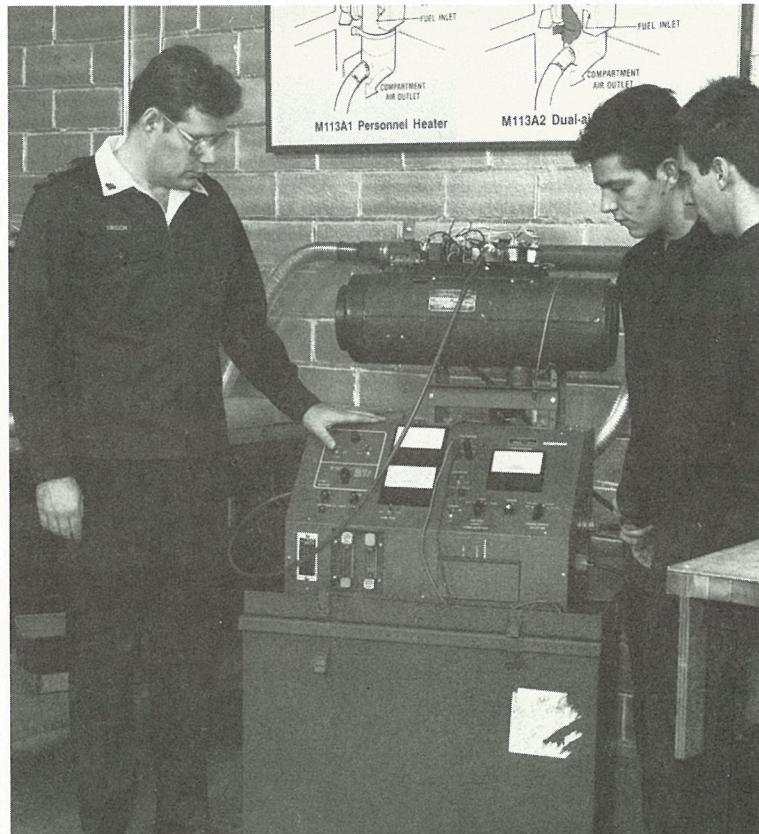




1 PLATOON VMT/SERVICING SECTION

Since the last EME bulletin, there have been a few changes in VMT/SERVICING section of CFSEME. In the fall of 1984, we incorporated a new HEATER TEST STAND into our TQ3 and TQ5 training packages. This specialized piece of equipment is used to check all electrical circuits and the complete fuel systems on all the various types of multi-fuel heaters used by today's military personnel.

We are also in the process of putting together a TQ3 and TQ5 package on the newly issued 3kW and 10kW DEUTZ diesel generator. We hope to have this package incorporated by the summer of 1986.



1 PLATOON BRAKES AND STEERING SECTION

The public always wonders where all those black tire marks on the Canadian highways come from. Well, they are from an emergency application of the truck air brake system.

Our southern neighbour, the USA, passed a law in 1975 on safety standards called Bill #121 to alleviate this dangerous situation.

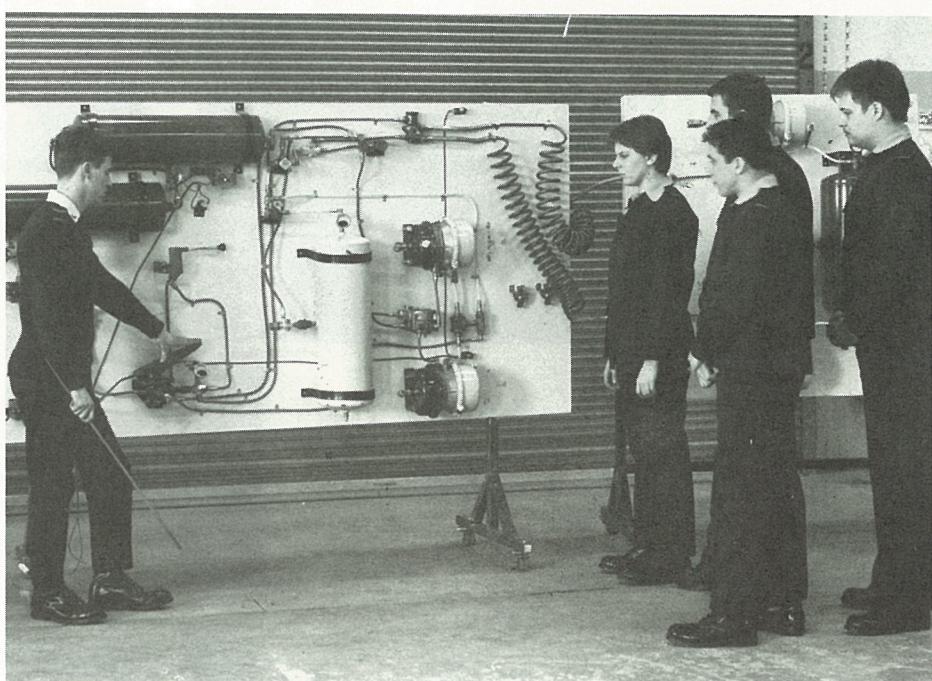
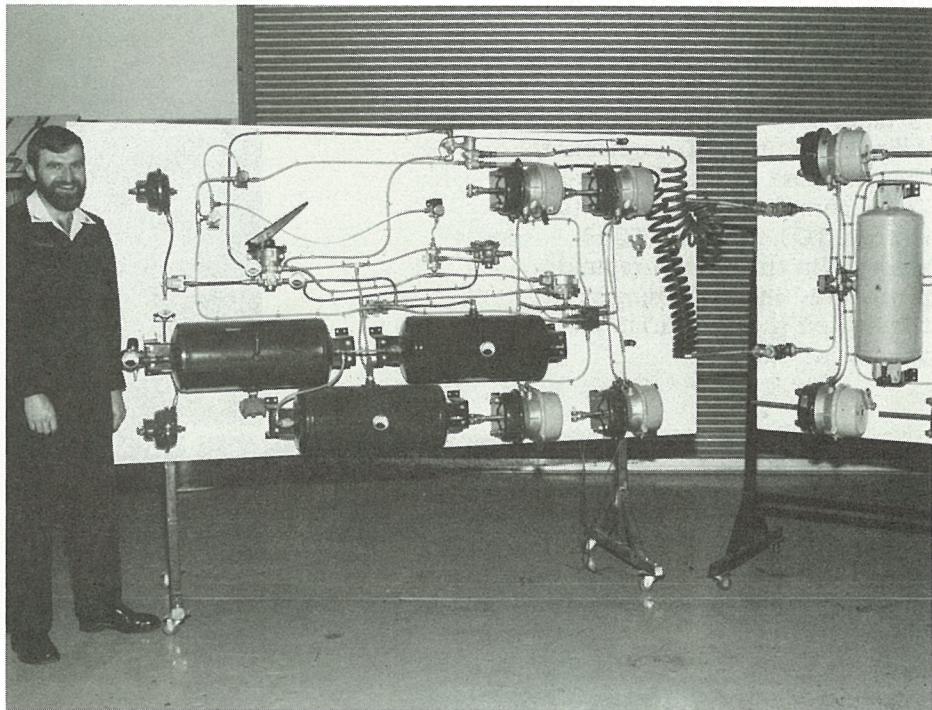
These "big" trucks are now required to have a dual air brake system that prevents unwarranted emergency applications.

The Canadian trucking industry and the Forces are following these same safety standards.

This is why a new air brake trainer was recently introduced in the Brakes and Steering Section of Vehicle Company, CFSEME.

The new state-of-the-art air brake board took over from the old fire truck chassis trainer, which many Veh Techs still remember with fondness as "MATILDA". The new trainer was built by Cpl Turcotte, an instructor at Veh Coy Brakes and Steering Section.

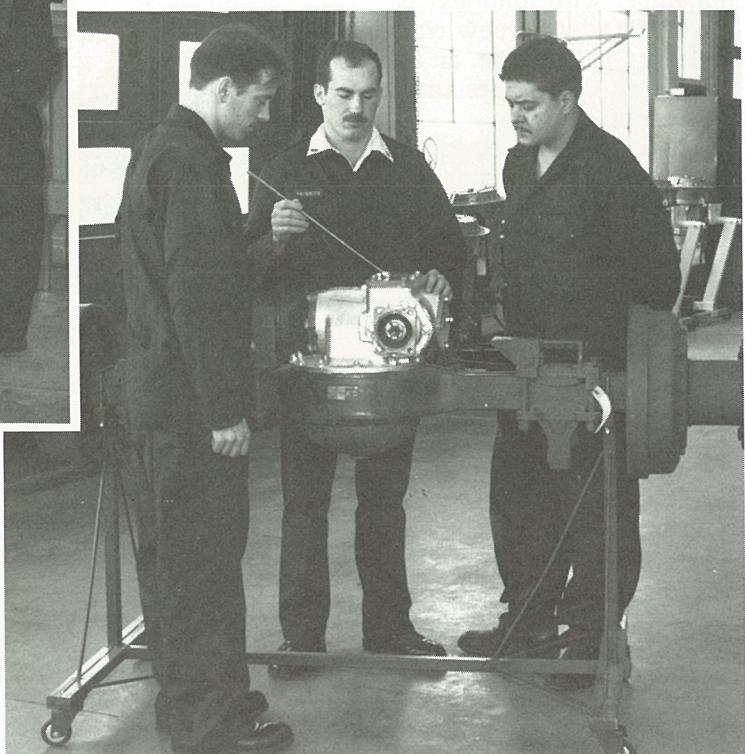
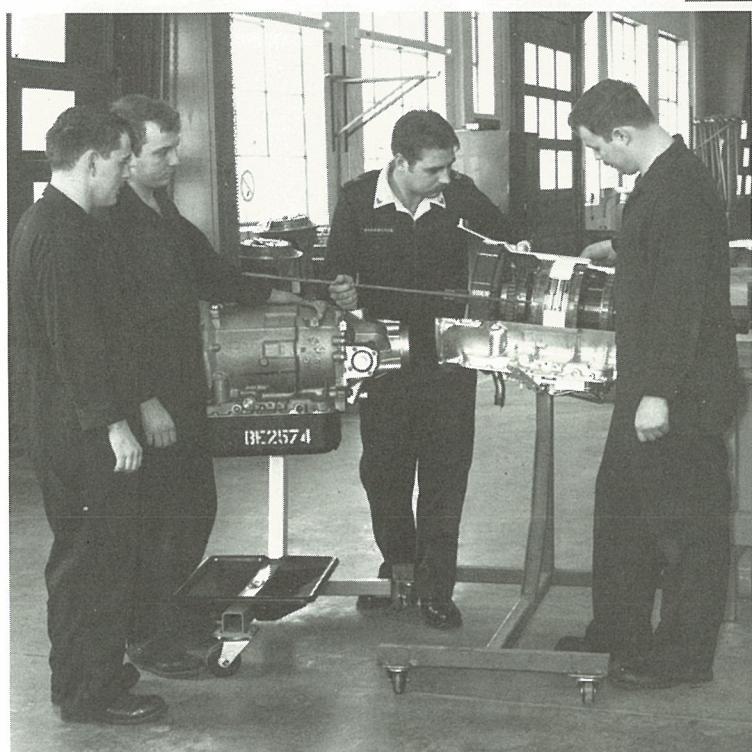
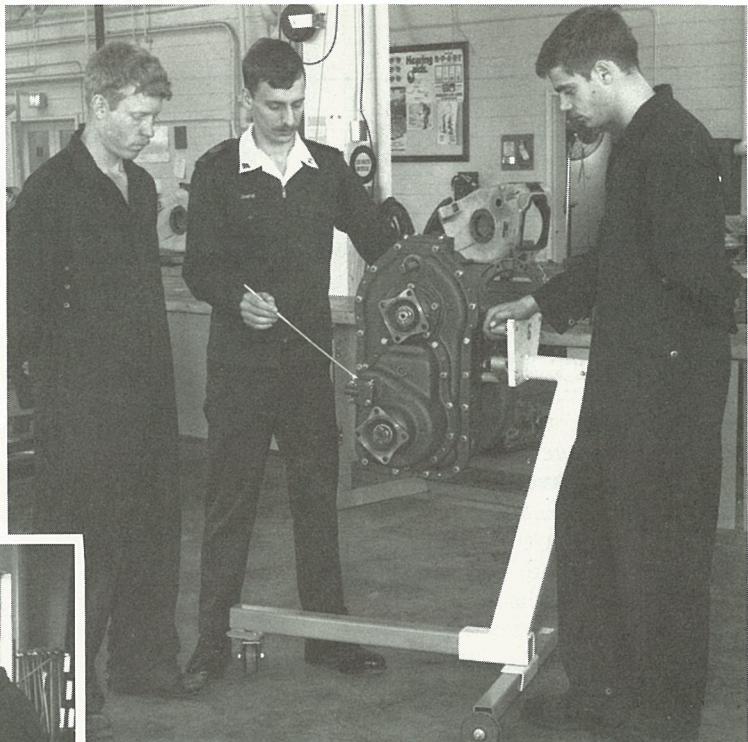
The new board, besides being much smaller, uses such items as colour coded airlines, which correspond to classroom OHPs, and the latest valving that is available in the industry. It also incorporates the single circuit and 121, or dual, circuit system.





1 PLATOON POWER TRAIN SECTION

Over the past two years POWER TRAIN SECTION has been kept very busy upgrading the quality of material, lessons, and training aids by introducing new equipment. The components are from the MLVW 2-½ Ton which includes such items as the MT 643 Allison Automatic Transmission, Transfer Case, and Differential. These components are used to instruct TQ3, TQ5 and TQ6B students in theory and rebuild procedures. In the coming year, training on the new ILTIS Jeep will be introduced.



2 PLATOON DIESEL SECTION

During the past few years Vehicle Company has gone through many changes and updates, as might be expected of any organization which must keep pace with today's constantly changing technology.

Diesel Section is no exception and has now incorporated the new Detroit four stroke 8.2 litre engine, which powers the military's new 2-½ ton truck (MLVW), into the training program. At the TQ3 level basic construction and operation is taught, while the TQ5 level covers more in-depth operation, fuel systems and troubleshooting.

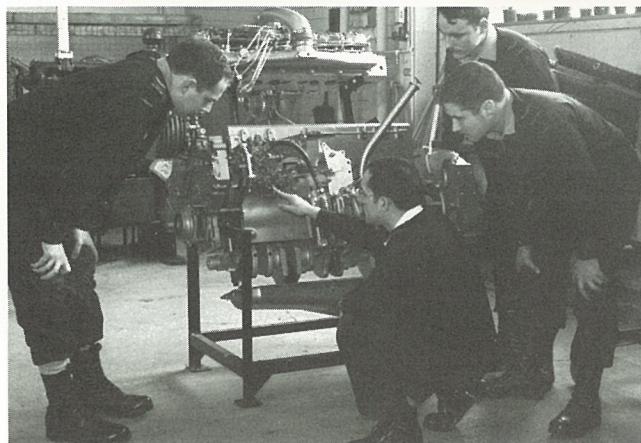
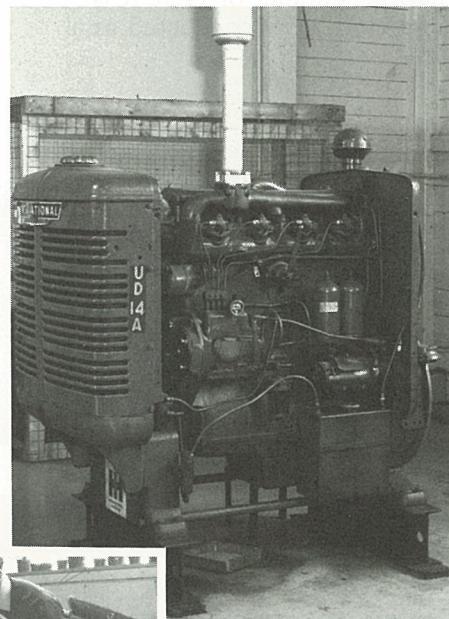
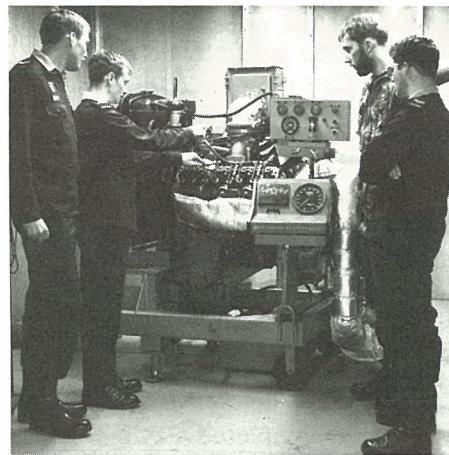
Since AVGP Section has ceased teaching tune-up procedures on the 6V53-T Detroit diesel 2 stroke engine, this engine has been added to Diesel section, teaching construction, tune-up and troubleshooting to TQ3, TQ5, 6B and TSQs.

During the spring of 1985, most of the instructors at Diesel Section completed a one-week course at Cummins Ontario in Toronto, which enabled them to update maintenance techniques and tune-up procedures. This new procedure increases the Cummins six cylinder 250 engine's (5 ton SMP vehicles) overall performance and efficiency. The new tune-up procedure can be found in C-36-CUM-015/MN-00Z.

At the EEM/AAGSE and TQ6B level of training, progress is being made in updating theory on Caterpillar and International engines to keep up with modifications and changing technical procedures taking place in the world of diesel engines.

Diesel Section has fared quite well in keeping abreast of technological changes which will help prepare us all for the future. However, there is a question in the section that has to do with the history of diesel engines. In the section, in Hangar #7, is a red International Harvester U.D. 14A six cylinder (gas/diesel) engine that has been here for years and no-one seems to know anything about it. For instance, what type of vehicle it came out of, where and when it was used, and for what. So if any of you older mechs out there know anything about this engine, the section would greatly appreciate some correspondence from you to help with this dilemma. One day it will be going to the Museum, and it would be less of an embarrassment if the School knew more about it.

On a final note, the health hazard that was evident in Hangar #7 from an inadequate exhaust system has been alleviated by tearing down the old system and installing individual exhaust outlets from each sound cell. This has greatly reduced exhaust emissions in the building allowing everyone to breathe a little easier, no pun intended.





2 PLATOON APC/AVGP SECTION

One of the newest additions to Vehicle Coy is the Swedish built BV 206 Carrier. This vehicle and trailer is fully tracked with all tracks being driven. At present this vehicle is being used primarily in the "CAST" role. Although it isn't being taught at present, MWO Prodaniuk (Standards), WO Phillips and MCpl Jutras have taken a two week familiarization course in LETE, CFB Ottawa. By the time this is published, MWO Prodaniuk and MCpl Jutras will have completed a two week maintenance course at the factory in Sweden. The Section will be fully ready to commence maintenance training on the BV 206 during the summer of 1986. It is expected to be conducted as a TSQ.



2 PLATOON EEM/AAGSE SECTION

The EEM/AAGSE Section is really moving ahead, mainly in the area of new equipment and training aids.

The two courses are becoming more enjoyable and informative for the students as well as the instructors.

To begin with, we have acquired five (5) new LAB/VOLT hydraulic trainers. With these trainers the students can design and construct their own hydraulic circuits. It gives them a much better understanding of hydraulics and enables them to become more proficient at troubleshooting problems that occur with the various pieces of equipment. Two of these trainers are now in use and eventually all of them will be set up.

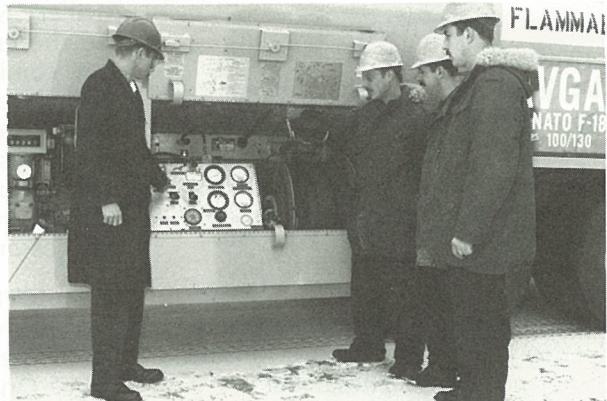
On the AAGSE side of the house, a new 18,000 L refuelling vehicle and a new D8 aircraft towing tractor have been received. The new ref tender is a real plus because in addition to the vehicle itself, the Section received some very good training aids. These include mockups for the AIR START system and pumping system, along with the various components of the pumping system.

The new aircraft towing tractor package included an engine and transmission assembly on a stand, including the hydraulic system for the steering and brakes. This also incorporates the BACK-UP system for brakes and steering in the event there is a hydraulic or engine failure while towing an aircraft.

Moving over to the EEM side, there has been a new computer system installed in the Grove AT 180 20 ton crane. This new system is easier to teach and more reliable than the old one.

Other equipments which are here now, but not yet being taught are the Case 1285 Excavator and a Water Purification Unit. These two units will proba-

bly be phased into the EEM package in the near future. The Case Excavator is to be used for rapid entrenchment. The unit in Europe has extra attachments, one of which is used for rapid runway repairs. The water purification unit (ERDALADER) is capable of purifying 1500 gallons of water per hour during field exercises.



ARTISAN COMPANY WEAPONS AND FCS PL

By Capt J.D. Crawford

This vital trades training platoon was last featured in the 1/83 issue of the LORE Technical Bulletin. Since then there have been many favourable developments. The aim of this article is to provide an update.

Results of the 1982/83 LEME Trades Occupational Analysis (OA) are now being seen in the training world. The OA produced new trade specifications to which the technicians are to be trained. New Course Training Standards (CTS) for the LEME trades were produced in 1985. The last major step is now being undertaken by CFSEME to produce the new Course Training Plans (CTP), Master Lesson Plans, and acquire the additional training aids for implementation of the new trade specifications and CTSs. It is anticipated that the TQ3, 5A, 6A and 6B courses will be generally lengthened thus producing better qualified technicians. The Weapons Technician TQ6B course will become a TQ6A course and it is planned to introduce a TQ6B technical package for the FCS trade.

WEAPONS SECTION

The major areas of concern in the Small Arms Cell have been the Small Arms Replacement Project (SARP: C-7, C-8, C-9) and the C-6 Machine Gun Implementation Project. To meet the pressing field requirements of having Weapons Technicians trained prior to the distribution of the new family of small arms, CFSEME will be conducting conversion courses to train command cadres. These cadres will in turn be conducting conversion courses for the Weapons Technicians in their respective commands. The first two conversion courses have been conducted and, after having resolved the problem areas, we now have our sights aimed at running two conversion courses per year until the

requirements are met. Steady-state training at the TQ3 and TQ5 levels will commence in September 1986.

As a result of the Weapons Technician trade being assigned the repair responsibility for the Life Preserver Underarm (LPU), the Armament Cell has now added this item to the training. All TQ3 students now receive instruction on the inspection, repair and maintenance of the LPU.

The AVGP TSQ has now been absorbed into the TQ3 and TQ5 courses with the final TSQ serials to be run in the Fall 86. This means the field will now be receiving technicians who will have been fully trained during their career courses on the repair and maintenance of the Grizzly and Cougar. Thus the requirement to send people away on the TSQ course will cease and the field requirements will be much better met.

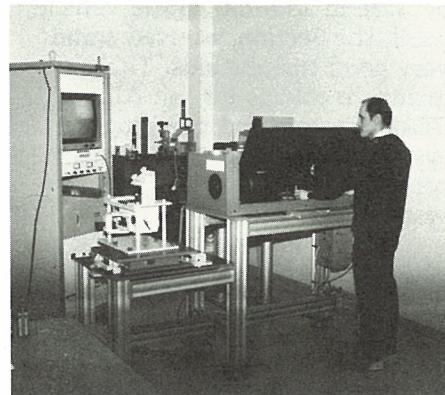
The Weapons Section has maintained a close relationship with the users, in this case the Artillery. During the Master Gunners' course, a one year course for Artillery MWOS and CWOs, we had the privilege and honour of their coming to CFSEME to receive training in hydraulics and the maintenance of artillery weapons systems. Many accolades were received, and we look forward to providing instructional services on their next course.

FCS SECTION

A major development for the 431 ELM trade is that the Performance Oriented Electronics Training (POET), prerequisite for the TQ3 course, has been extended from POET Block 1 (40 training days), to include POET Block 2 (35 training days). Commencing with Serial 8603, the students will be arriving at the School with a total of 75 days of electronics training prior to commencing their

TQ3 course. There is no doubt about the positive benefits to be gained from this additional training as in the past problems from a lack of electronics training had persisted through to the TQ5 courses. This means that units can expect more of the new TQ3.

The FCT(O) trade has some fairly sophisticated optronics equipment in their inventory of responsibilities. Sgt Dave Travers is the resident CFSEME expert shown here using the test and adjustment equipment in the Leopard SABCA sighting equipment.



ARTISAN COMPANY WEAPONS AND FCS PL



Recently life has become very interesting in the Small Arms Instructional Cell with the introduction into service of the new SARP and C-6 weapons. With the C-6 and C-9 MGs on the workbench Sgt Dick Hem and MCpl John Aitkenhead (since promoted to Sgt) are proudly posing with the C-7 and C-8.

Advances in high tech are making their impact in the FCT(E) world. Shown here is Sgt Mike Palubeskie repairing a MILIPAC (Militarized Portable Artillery Computer) in preparation for the TSQ courses now being conducted at CFSEME.



With the introduction into service of the Militarized Portable Artillery Computer (MILIPAC), came the requirement to train for the repair and maintenance of this high tech item. The 432 Cell is now conducting this TSQ, with the first course having graduated five students in Fall 85. It is a demanding course of 40 training days, and all candidates selected for it are advised to review their TQ5 notes on the XH Computer Principles package.

The radar station closures have resulted in a surplus of MOC 231 Radar Technicians, many of whom are being remustered into other electronic trades. Conversion courses are being set up to accommodate up to 33 personnel remustering into the 432 FCT(E) trade. These conversion courses will be run in 1986.

With the TOW missile system having been upgraded to TOW II, the TQ5 training has undergone the appropriate changes. The ini-

tial conversion training requirements were met by having the training done by the manufacturer. It is planned to start conducting the TOW II conversion courses at CFSEME in 1987.

Advances in technology are having an impact on the 433 Optronics technicians. In keeping pace, this trade is moving towards becoming an opto-electronic trade vice opto-mechanical. The 433 TQ 5 students are now receiving the full XG Solid State package and receive the qualification upon successfully graduating from the TQ5 course. An example of advanced technology that the Optronic trade is responsible for is the Handheld Laser Rangefinder, a virtually all electronic item.

Facilities have been upgraded in the recent past. A new TQ5A, 6A Optronics Lab was completed in 1985 and is proving to be most beneficial.

The Leopard Optronics TSQ course has been substantially

upgraded. New jigs and fixtures have been added to the inventory and CFSEME is teaching the associated repair techniques. All Leopard optics systems can now be successfully repaired.

The Anti-Armour Project will be introducing over a long timeframe a range of new armour defeating weapons systems that will be having a big impact on the Weapons and FCS trades. First to be introduced is the TOW Under Armour, which is tentatively scheduled for introduction into service in 1988. More on how this will be affecting the field, and specifically CFSEME, in a future article.

In conclusion, the Weapons and FCS Sections have seen many improvements to the training of our technicians. Many more challenges await us in implementing the new training called for by the new trade specifications.

ARTISAN COMPANY EXPLOSIVE PLATOON

By Capt B. Letourneau

The Explosive Platoon consists of two distinct sections, Explosive Ordnance Disposal (EOD) and the Ammunition Section. Neither section is manned by any EME Branch personnel, but since the training given is technical in nature, it was decided a long time ago that it belonged in a technical school such as CFSEME.

The EOD Section teaches mainly two TSQs, the Basic EOD course which shows personnel how to destroy military ordnance, and the Advanced EOD course

where military personnel and police officers are instructed in methods of disposing of terrorist devices. To perform this training, the section is established with 13 instructors of four different trades: Air Weapon Systems, Ammo Techs, Field Engineers and Clearance Divers.

The Ammunition Section is smaller in size and established for only seven instructors. Since the section teaches two or three TQ3 and one TQ5 Ammo Tech courses per year, and each course is about

six months in length, instructors are always busy. Many think of Ammo Techs as Supply Technicians. It is true they wear the Logistic Branch Badge, but the Supply training accounts for only one week in each course. The rest is spent teaching Ammo Techs all about ammunition so they are extremely knowledgeable on the subject and can justifiably be considered as experts.

FIRST MATERIALS TECHNICIAN QL3 GRADUATES

By Capt I.J. Hayward

Front Row (L to R), Staff Sgt Locke (Ref Sect), WO Cousins (Weld Shop), MWO Fulton (2 i/c Mat Pl), Maj Bowman (OC Art Coy), Capt Hayward (Mat Pl Comd), WO Urquhart (Stds Coy) now MWO, Sgt Heldman (Weld Shop) now WO.
Back Row (L to R), Students Cpl LeSaux, Cpl McIntosh, Cpl Kilfoyle, Cpl Shea, Cpl Lemoine, Cpl Anketell, Pte Kuhn, Cpl Trembley, Cpl Reid, Cpl Hogan



FIRST MATERIALS TECHNICIAN QL3 GRADUATES

On 30 September 1985 Materials Technician MOC 441 QL3 course serial 8501 graduated from CFSEME Borden. This was the first QL3 course to graduate in this new trade, which was formed on 1 January 1985.

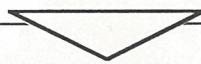
The trade was developed in the LEME Branch to meet the requirements of the Land Field Force. It encompasses machining, metal working, welding, auto-body repair, painting, fibreglass repair

and rough carpentry skills. These tradesmen will perform the duties previously carried out by 500 series tradesmen; 561 Metal Techs, 562 Machinists and 563 Refinisher Techs attached to land units and Base Maintenance shops.

The Materials Technician (Mat Tech) trade has 255 established positions of which 200 have been filled by remusters from the 500 series workshop trades. A total of six QL3 Mat Tech

courses of 178 training days in length were completed in April 1987, and all conversion training is expected to be completed prior to 1 April 1988.

The Commandant of CFSEME, instructional staff, and all members of the LEME Branch extend their congratulations to course 8501 and wish them the best in their new trade.



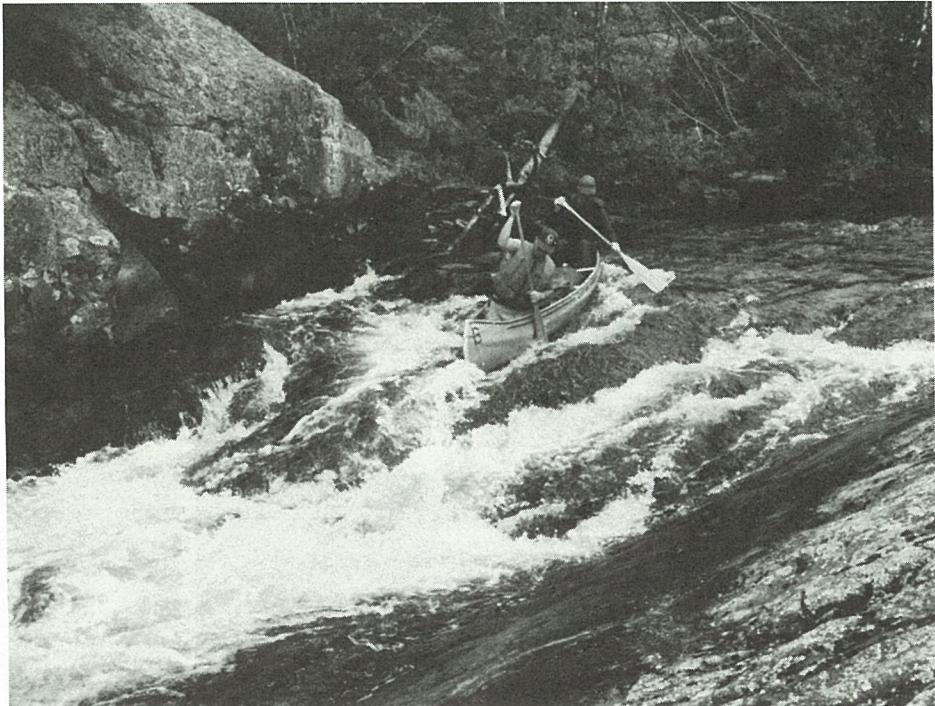
ADVENTURE TRAINING MAINTENANCE STYLE

by Lt D. Scuka

Since 1985, when CFSEME became the new LEME Branch School, one of several new initiatives was a bi-annual adventure training expedition. There are two aims to this training: to increase morale and esprit-de-corps and to give staff a memorable break from instructional duties. I am happy to say that thus far each expedition has been a complete success.

As an added benefit, the participants are tasked with organizing their own administration, supplies and transport. This is an excellent opportunity to develop organizational and leadership skills. Likewise, during the trip itself, all expedition members are responsible for their own kit, etc. Overall, each trip has been a character building experience that normal classroom training does not provide.

In June this year, fourteen volunteers participated in Ex CFSEME II. This was a six-day, 42 km canoe trip through the scenic wooded areas of the Kawarthas. The trip started at Long Lake, near Peterborough, Ontario, and ended up at Buckhorn



Lt Dan Scuka and Cpl Laurent Levesque about to die gloriously for God, Queen and Country.

ADVENTURE TRAINING

Lake. This route provided several different types of canoeing. It covered both the lake and river areas, as well as eight portages and several waterfalls.

The expedition was organized into seven two-man canoe teams. The overall OPI for the trip was Capt D. McDermott, and the expedition leader, (who was not responsible for the weather or rations) was Lt D. Scuka. Each canoe team carried their own tent and supplies. As each team was in charge of their own canoe, participants could only blame themselves for wet sleeping bags or soggy rations. Thanks to careful preparations and close attention to safety, the most serious casualty was MWO Damour's left combat boot, which was claimed by a raging torrent of water half-way down the Mississauga River.

Comments during the trip included "I wish MCpl Moore would stop snoring!" and "Maybe we shouldn't let Lt Scuka drive the carryall . . . ?" Comments after the trip changed to "Jeeze - MCpl Moore snores a lot!" and "We definitely should not have let the Lt drive the carryall!"

Although it was the initial intent of all concerned to eat only the IMP rations provided, we were forced to resort to "survival" fishing. This along with the odd frog leg and Hershey bar permitted all to eat reasonably well.

Planning is now underway for a

Spring 88 trip that will have two aims. First, we will attempt to finally teach MCpl Mills how to paddle a canoe. Second, a thorough search will be conducted to find MWO Damour's missing combat boot.



MCpl Gary Innes and Cpl Laurent Levesque lead an enthusiastic team on their way to throw Sgt P.H. Grulke's canoe off a cliff because he's shorter than everyone else and couldn't stop them.



MWO P.D'Amour explains all the possible uses for a case of "Blue". Empty cans are used to signal SAR aircraft in case of accident.

Cpl Lugt, MCpl Rouleau, Sgt Grulke,
Capt Levesque, MCpl Mills, Cpl Lacasse,
2Lt Scuka.
Capt McDermott, MCpl Moore, MCpl Harris,
Cpl Burke, MWO D'Amour, MCpl Innes,
Cpl Phillips.



NEW COLONEL COMMANDANT OPENS NEW HEADQUARTERS

Capt G.R.C. Emmerson

At 1100 hrs, Friday 4 September 87, Col Svab, our new Col Comdt of the Branch, officially opened the new CFSEME HQ.

Ever since the old School, CFSAOE, split up two years ago, giving us our own LEME School, there has been a concerted effort to regroup and establish "LEME lines". This includes everything from new construction, to modifying existing facilities, to moving. As many will know, the Headquarters of the School remained in Croil Hall after the split, sharing it with elements of the new Airforce School, CFSATE. The location of Croil Hall fell within the projected lines of CFSATE. Not only this but CFSATE quite rightly was a little disturbed that this building in their midst, which they viewed as theirs, was flying LEME/Army colours. CFSEME on the other hand was eyeing with interest a CFSATE building which was strategically placed at the confluence of two roads leading into LEME territory. A deal was made.

The swap took place in mid August after a great deal of planning and arranging. Responsible for the planning and smooth transition was 2Lt Donna Martin who was awaiting the start of her next phase of training in Regt Coy. In recognition of her efforts, she received special dispensation from OC Regt Coy to leave her training just long enough to take part in the official opening.

Watched by all members of HQ & Stds Coy, our Col Comdt was asked to carry out what might loosely be referred to as a Ribbon Cutting ceremony. There wasn't any ribbon so a piece of chain was found. As any engineering type knows, the moment you make one modification it creates a

dozen others. The chain required something substantial (hooks) to hold it up. The hooks happened to be attached to M816 wreckers, the scissors had to be swapped for more capable ones, and so it went on. All this came as no surprise to Col Svab who thought it was most appropriate, and cut the chain in spite of conflicting but good natured advice from onlookers.

After the chain was cut and the hooks fell away, Col Svab was

invited inside to sign the visitors' book and tour the facilities. This was of course only one event which took place during the three days of his visit. In addition to touring the other parts of the School Col Svab also took the Salute at the School parade earlier that morning, which was to celebrate the second anniversary of CFSEME. In all it was a busy time for the new Col Comdt of the Branch and it is hoped he will return for many more.



From L to R - 2Lt Martin assures Col Svab that only the hooks will move. Witnesses are Maj Thibert, the new OC HQ & Stds Coy, Col Nappert, the School Comdt, and the new RSM, CWO Johnson.

2Lt Martin shows alarm as Col Svab is about to cut the chain, believing the swinging hook will remove Maj Thibert's glasses from his face. Col Nappert stays out of the way and almost out of the picture.

No damage. No injuries. Applause for a successful parting of the chain.



ONGOING SCHOOL SUPPORT FOR THE MUSEUM

The Diamond T

WO D. Shwaluk

Another vehicle is now on display in the Base Borden Museum. It may bring back memories for some and serve as general interest and education to the majority of LEME pers. In any event, one would have to agree that the wrecker of 40 years ago has little in common with our present model.

The "Diamond T" is of 1944 vintage and on retirement from the Canadian Army after World War II was acquired by the Toronto Transit Commission (TTC). The TTC used it primarily for recovery of streetcars and when it eventually became surplus LCol (Ret'd) Bruce Savage bought it. In 1984 LCol (Ret'd) Savage, a former RCE/MILE officer, donated the vehicle to the Base Museum. The wrecker is presently being restored by members of Vehicle Coy and Artisan Coy, under the direction of the OPI, WO Shwaluk D.

Some of the technical details are as follows:

Designation: Tractor (4 Ton, 6 x 6)
Manufactured by: Diamond T Motor Car Co.

Operational Role: Used for recovery and towing of vehicles and equipment mainly be RCEME units.

Body Details: Two telescopic brace legs, two swivel booms, two power winches each with 200 ft. of cable, oxy-acetylene welding equipment. Capacity 5 tons on a single line, 10 tons with double line and snatch block.

Powered By: 131 brake horsepower 6 cyl. in line Hercules engine (gas).

Weight & Dimensions: Wheel base 151 inches, weight approximately 12 tons.



WO Cousins points out the stages of the Diamond T restoration to the project OPI, WO Shwaluk, as Cpl Felletta puts some final touches to the body.



The Comdt of CFSAOE at the time, Col J.I. Hanson, exchanging a certificate marking the donation of the Diamond T recovery vehicle, for the vehicle's keys, with LCol (Ret'd) Savage. CWO Vachon, the Base Borden Museum Coordinator, looks on.

CFSEME RSM RETIRING

CWO L.W. Conrad is presented with a special pace stick during the CFSEME parade on 19 June 87. It is from all members of the School and is to mark his retirement from the CF.

The RSM leaves at the end of July after his last official parade which is the Change of Command of the Base Commander. This is a fitting last parade as BGen J.I. Hanson, the outgoing Base Commander, is the first LEME officer commanding the Base, and both he and CWO Conrad go back a long way together.

CWO Conrad's service started in October 1953 with the 1st Halifax AA Regt RCA(M) where he served until he was old enough for the Regular Force. In August 55 he enrolled in the RCASC and

served in Borden, Egypt, Gagetown, and Germany before changing to the RCEME cap badge. Since then he has been in Kingston, back to Germany and Gagetown, then Halifax, and finally to the School in Borden.

For the past two years CWO Conrad has been a perceptive and experienced leader, maintaining a delicate balance between School disciplinarian, and the mentor and advisor to young technicians. He will be sorely missed by CFSEME, his trade, and the LEME Branch. Everyone wishes him and his wife, Helga, a long and happy retirement.



THE LT COL RALPH LIBBEY AWARD

The first recipient of this new award is Sgt Hem (since promoted to WO).

Each year the trophy will be presented to a member of CFSEME who is leaving the School and is judged to have contributed the most during his tour. An instructor has a far greater influence on a greater number of technicians than is generally appreciated. At last there is a way of recognizing this contribution to the Branch.

Even though it will be presented to one person each year, the trophy should stand as a tribute to all the instructors, who have helped shape the LEME occupations for so many years.

WO Hem joined the Canadian Forces in 1974 and after graduating as a W Tech L was posted to 202 Wksp. This was followed by tours with 3 PPCLI, BML Kingston, and then to CFSEME in Borden. In between times he did a tour in



THE LT COL RALPH LIBBEY AWARD

Ismailia, Egypt in 1977 and Cyprus in 1980. Since his arrival at CFSEME, he has been teaching armament and small arms, the latter of which is his real interest and forte. As a result he has been the primary instructor for the SARP weapons ever since they first arrived at the School.

The summer of 1987 will have been a very eventful period for WO Hem. The Libbey trophy in June, promoted in July, and posted to 208 TSD Montreal soon after.



TOP PERFORMANCE ON TWO COUNTS

By Sgt J. Davidson

The LEME tradespeople are expected to be good soldiers as well as good technicians. Here's an example that shows it is still true.

Gary K. Gagawchuk joined the CF on 31 May 1977 with a very strong desire to become a mechanic. Five years later, in June 1982, he was posted to the School as an instructor in Power Train Section, Vehicle Company. In October 1983 he completed his QL6A training, and then the following year, between March and September

MCpl Gagawchuk receives the Top Student award from LCol R.A. MacKenzie, the Inspecting Officer for the graduating course.



TOP PERFORMANCE ON TWO COUNTS

1984, he did a tour with CDN LOG COM UNDOF in the Light Vehicle Section.

He was promoted to MCpl (LQ) on 1 November 1985, obviously as a result of his superior job knowledge and excellent instructional abilities. Numerous letters are on his file citing his outstanding performance in these and other areas.

MCpl Gagawchuk completed his JLC on 11 February 1986, graduating as the top student. Also in this issue one will notice a photograph in the Vehicle Company, Power Train Section article, which shows Gary Gagawchuk teaching QL5 students on a cutaway model of the Allison 600 series automatic transmission. This super training aid was a project of his. Even in the very small photo one can see that it was a difficult task, well thought out, and well executed.



This is the trophy he can keep and take home! Presented by Capt J.W. Hatch, A PL OIC.



THE URQUMOBILE

by Capt G.R.C. Emmerson

At various times we have all considered how well someone else had put his trades training to use. In fact that is being done every time a PER is written, but how often have we seen this expertise and a little ingenuity used to complete a major project for oneself. I have been fascinated by one such project ever since I found out about it in Winnipeg a few years ago. At the time I was picking the brains of one of our best welders, to do with a project of my own, when one of his cohorts told me that Larry Urquhart (Sgt at the time) had nearly finished a very ambitious project called the "Urqumobile". He was a keen fisherman and hunter and had never found a vehicle which fully met his needs in the bush. Someone told me on the quiet that



THE URQUMOBILE

because Larry couldn't hit the moose with a bullet he needed a fast all-terrain vehicle capable of catching up with the animal so he could beat it with the butt. Of course, I didn't really believe the story. Nevertheless, he started to design and build a vehicle capable of carrying a couple of hunters, their boat, gear, beer, and whatever else. It had to go through muskeg and anything that got in their way. After two years, 1500 hours of labour and approximately \$4800 of his pocket money, he had completed his dream machine.

All this was more than six years ago now and since then it has proven itself through muskeg, swamp, mud, and open water.

The only area in which it is limited is deep and soft snow, because the treads aren't wide enough for that. When I first saw it, Larry Urquhart was working out the only real design/mechanical bug the machine had; making a stronger drive shaft which could take the power and speed which it was developing.

If it was a military vehicle, the following would be some of the Urqumobile's statistics from the CFTO Data Sheet:

Hull Construction:	Aluminum and fibreglass
Length:	12.5 ft
Width:	67.5 inches
Height:	48 inches
Ground Clearance:	14 inches
Engine:	Datsun,

Transmission: 110 H.P., 1974 Datsun, manual 4-speed
Steering: Independent hydraulic disc brakes on a cut down rear axle and differential assy
Track: Flexible 15 inch wide double belts

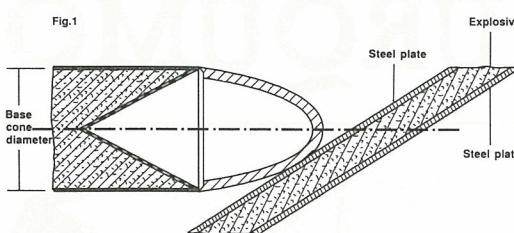
WO Urquhart is now in the new 441 trade and presently the Standards Design Writer for the trade at CFSEME. Although he still uses the Urqumobile, it doesn't get out as much these days whilst he is so busy designing and writing the new course packages.

REACTIVE ARMOUR

The Western World's introduction to reactive armour came with the Israeli invasion of Lebanon in 1982. At that time, Time Magazine carried a cover picture of an Israeli tank with a series of black boxes on the hull, front glacis and turret.¹ Little did we know that these black boxes could revolutionize the anti-armour battle.

Since the introduction of the American bazooka and the German panzerfaust, infantry anti-armour weapons have relied almost exclusively on the chemical energy shaped charge round. The shaped charge is relatively easy to manufacture and modern shaped charges can penetrate approximately 6 to 7 times their base cone diameter (see fig 1). The largest of the infantry anti-armour rounds, TOW 2, with a 152 mm warhead, could easily penetrate greater than 900 mm of the toughest tank steel.

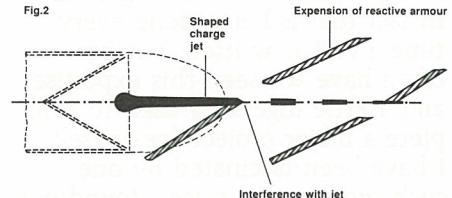
The advent of reactive armour, basically a steel explosive sandwich (figs 1 and 2), is changing all



that. Reactive armour, by interfering with the shaped charge jet, decreases the penetration in the order of 50%. This is significant when we consider that modern tanks have front glacis plates 900 mm thick. The addition of reactive armour can make the front glacis impenetrable to even the largest of the Western World's infantry anti-tank guided missiles.

Reactive armour effectiveness is created by the detonation of the explosive in the reactive armour and the subsequent outward expansion of the steel sandwich. The explosive interior is deliberately chosen to be insensitive to kinetic energy rounds. It is only

the shaped charge whose tip velocities reach 11 km/sec that has sufficient energy to detonate the explosive. The detonation shock wave from the reactive armour and the expansion of the steel sandwich cause the shaped charge



jet to deflect from its path and thus drastically reduce penetration. For example, Israeli tanks in Lebanon in 1982, previously vulnerable to RPG 7 were made immune to these same shaped charges with the addition of reactive armour. The weight penalty for this protection is only a few thousand pounds, barely noticeable to a 50 ton tank.

As keeping our infantry out of the anti-armour battle is not an adequate solution, what now? Most Western Countries are trying to rapidly introduce tandem shaped charges; the first to destroy reactive armour and the second to penetrate the tank armour. This is only a stop gap measure as most armour designers already foresee dual packaged reactive armour, the resulting series of three explosions will make it very difficult for the main shaped charge to maintain its original path. The shaped charge jet could be sufficiently deflected to miss the tank. Other solutions to defeat reactive armour with chemical energy shaped charges include top attack or slant attack systems. The Swedish Army has accepted one system recently, "BILL". This slant attack system is less affected by reactive armour because of the direction of the attack. Systems relying on top attack or slant attack are more complex and thus more expensive.

Kinetic energy rounds do not detonate reactive armour and their penetration is not degraded. Anti-armour weapons designers

are examining ways of launching kinetic energy penetrators from launchers like the Carl Gustav recoilless rifle then accelerating the rounds to the speed required to penetrate tank armour.

Guidance of these rounds and the weights associated are but two of the stumbling blocks that will delay the development of these systems until at least the late 1990's.

All this is hypothetical you say! A recent Jane's Defence Weekly article starts with this headline: "Soviets to deploy T64 reactive armour"⁵. The infantry anti-armour battle has just had a giant "monkey wrench" thrown in the works. The infantry annihilation of tank columns as was seen in the October 1973 war in The Middle East is a thing of the past. The Western Armies will be forced to look at bigger guns, tank destroyers and more complex guided missiles to try and stem the armour advance. This may well blunt the individual soldier's ability to deal with tanks and could restore tanks as the Arm of Decision.

BIBLIOGRAPHY

1. Time Magazine Front Cover Photo 21 June 1982.
2. Short Course on Penetration Mechanics Textbook published by Southwest Research Institute, San Antonio, Texas.
3. United States Patent 4368660 dated 18 January 1983 Protective Arrangements against Projectiles, Particularly Hollow Explosive Charge Projectiles.
4. Military Technology 4/86 pg 18-28 "From Array to Disarray? Tactical Aspects of Active and Reactive Armour", Simpkin, Richard.
5. Jane's Defence Weekly 17 May 1986, pg 863 "Soviets to deploy T64 reactive armour", Simon O'Dwyer-Russell.

1-1/4 TON SMP TRUCK LIFE EXTENSION PROJECT

By Maj L.T.D. Steel
(DSVEM 2-2)

Nov 84 saw the introduction of the refurbishment/rotation project on the 1-1/4 ton SMP truck fleet that was designed to get the fleet through until the early 1990's when replacement action would occur. The decision to extend the life of this fleet was taken two years previously as a result of a shortage of funds in the DND

Capital Programme of replacement vehicles.

On receipt of this direction there was some concern on the part of the LCMM staff. This "concern" was attributed to the fact that the 1-1/4 ton SMP fleet was built in 1975/76 and was based on the one-ton GM commercial truck. Although "militarized" to meet

SMP requirements it was not designed to have the same life expectancy as that of an SMP vehicle. As a consequence of this, any life extension work to be contemplated would require guidelines and further study.

One of the early studies was carried out by DLES and it was to make an assessment of what the

1-1/4 TON SMP TRUCK LIFE EXTENSION PROJECT

economic life of the vehicle fleet was. The results from this study revealed that the mean economic life was 88,000 km. In looking at the complete fleet it meant that it was possible to expect to double the life of the truck from eight to 16 years. The report further stated however that the study did not take into consideration spares availability or corrosion to the truck body. These two factors would be addressed separately.

Having established an economic life for the truck, the various directorates within NDHQ could now work together to establish parameters for the project on extending the life of the fleet. It was agreed that the fleet would be extended to 1992. Due to the shortage of 1-1/4 ton trucks, only those which could not be salvaged due to fires or accidents would be PCC'd. The trucks would not be put through a rebuild process as such as only the bodywork would be done. In addition, several product improvements would be introduced such as strengthening of the cab and hood, addition of a "skid plate" for the transfer case and a bracket to strengthen the front frame extension. Finally, to meet the mean 88,000 km for the fleet, it was recognized that a rotation plan involving high and low mileage vehicles would have to be developed and put into effect.

It was understood from the outset that the most serious problem facing the LCMM in extending the fleet was the corrosion problem being experienced by these "thin skinned" trucks. An engineering study of this problem was carried out on a statistically valid sample of vehicles in various locations to define the extent of corrosion and provide recommendations for corrective measures needed to keep the fleet in service. On the conclusion of this study body parts had been determined, a CFTO on their installation had been prepared and product improvements designed.

Prior to embarking on the project, it was deemed essential to be assured that the truck frame was still sound. To that end NDT staff from Trenton carried out surveys in Valcartier, Gagetown and CFE to confirm the integrity of the truck frames. Some minor cracking was found in the front frame ends, the front spring hangers and differential cross members. All however could be repaired easily by welding or replacement.

Parts were a major concern as well. When the fleet was originally purchased, the full range of spares was reduced from that of an SMP vehicle as many of the parts could be procured locally. As a result, only 749 items of 2111 making up the vehicle were assigned NSN's. If the life extension project was to be successful, spares would have to be purchased, catalogued and controlled centrally from NDHQ. Although relatively straightforward, parts designed in 1976 have changed over the years and there was and still is an on-going problem of ensuring purchased parts are suitable by doing form, fit and function of them at LETE or if necessary at some of our bases.

Of course the vehicle rotation aspect of the project was considered extremely important. The concept had to be developed and then approved at the DCDS level and finally implemented. During this study it was found that van body configured trucks had low mileage while TCV's/cargo versions had high mileage. The location of some fleets resulted in a high accumulation of mileage such as CFE and 2 CER where training areas are located far from the base. The rotation plan, well, it was decided to rotate high and low mileage vehicles first within units and if necessary escalate to other units on the same base and then formations. In all some 457 high mileage trucks were to be changed with a similar number of low mileage trucks.

The last factor to be considered

but certainly of importance was money. A project of such magnitude could not be done in-house due to the tremendous workload involved. The only option then was to use local contract facilities. This however would cost money and action was taken to have monies made available for the project.

At this point in time it was assumed that all factors had been considered. Now it was time to actually introduce the project and get it started. Bearing in mind that there are over 2800 trucks involved, geographically dispersed throughout Canada, Cyprus, CFE, Norway and other places discovered from time to time like Texas, co-operation and co-ordination was necessary between staffs at all levels. To highlight the importance of the project and to gain the necessary co-operation of various staffs, a letter signed by the DCDS was distributed which outlined the project and the reasons for its introduction. Briefings were given to all Commands and numerous bases were visited explaining the project in detail. With everything in place the project was launched in Nov 84 with a completion date of Mar 87.

There were of course "teething problems". Costs have been escalating and are due in part to the continuing corrosion on vehicles not yet refurbished. A patch designed in 1982 no longer is large enough to repair a vehicle in 1986. Costs have risen from \$2100 in 1984 to \$3,000 in 1986 per vehicle.

At the time of preparing this article we are mid summer of 86 and Mar 87 is not too far away. Based on our reports of June 86 with 65% of the project time expended, 76% of the fleet has gone through the refurbishment project and 93% of the fleet has been rotated.

Plans are now underway to replace this truck fleet. If replacement action is delayed beyond 1992, then it will be necessary

1-1/4 TON SMP TRUCK LIFE EXTENSION PROJECT

once again to look at refurbishing the fleet.

If a similar project is undertaken, those problems encountered in 1982 will no doubt be found again as well as new ones. In any event, this project has demanded close co-operation between NDHQ and Command staffs and the bases. The immediate goal has been achieved.

get the truck fleet to the 1990's. The future on replacement depends on many factors. Our collective responsibilities however are the same, to keep the equipment in a safe and operational condition to meet its intended role.

Arte et Marte

BV206 SMP MOSV

by G.S. Sanderson, P. Eng

The three types of BV206 are the first Standard Military Pattern (SMP) Medium Over-Snow Vehicle (MOSV) purchased in quantity for a requirement that has been outstanding for more than 20 years. These vehicles are capable of travel both on and off roads under almost all conditions and in all climatic extremes. In particular, its large track area and articulated steering allows the carrier to travel over snow depths, soft ground and obstacles which are impassable to almost all other tracked and wheeled vehicles. The BV206 is also amphibious with next to no pre-entry work and is propelled in the water by its four tracks.

The BV206s produced by A.B. HAGGLUND & SONER of Sweden, were purchased to satisfy urgent



AMPHIBIOUS AND OVER-SNOW VEHICLE
The BV206 is a tracked carrier with a large cargo bed at the rear. It is towed by a long trailer or sled. On top of the vehicle, there is a large piece of equipment, possibly a searchlight or a sensor system, mounted on a tripod. The background shows a snowy landscape with some trees.

high mobility requirements for lead elements of CAST Bde Gp units or the AMF(L) Bn Gp units. In particular, the BV206s were purchased for operations and training in North Norway. The 100 vehicles purchased are made up of 80 x BV206 personnel/cargo carriers, 12 x BV2061 Command Post and 8 x BV2063 ANTI-TANK TOW vehicles. The same basic BV206 is also held by most NATO allies for use in North Norway as well as their own countries.



M113 A2 APC DOZER WITH ENGINEER/PIONEER EQUIPMENT

by CWO A.E. Rest

BACKGROUND

The current technology employed by Field Engineers for cratering (camouflet tube and thumper) dates back to World War II. The procedure which involves driving the camouflet tube into the ground and planting explosive charges to blow craters is labour intensive and too slow for modern battlefield conditions. An attempt to speed up the process by using a dozer blade attachment to sink the camouflet tube proved unsuccessful. In 1982 DCMEM 4 began developing a prototype Engineer Specially Equipped

APC dozer (SEV) which provided a hydraulic auger for drilling charge holes. The prototype has been thoroughly tested by LETE, 22 Field Squadron and the US Army.

SYSTEM DESCRIPTION

The SEV kit is designed for installation on the product improved (cooling and suspension) M113A2 APC Dozer. The kit adds five major features to the vehicle:

- a. Improved layout for personnel and stowage. Communications equipment has been

repositioned to provide easy access for both driver and commander. Folding seats for section personnel and the commander were replaced with box type seats which provide more internal stowage capacity. The reorganized layout provides room for carrying eight personnel with a full complement of field engineer/infantry pioneer section stores and equipment, including NBCW protective equipment and weapons;

M113 A2 APC DOZER WITH ENGINEER/PIONEER EQUIPMENT

- b. Hydraulic Earth Auger. Twenty centimetre diameter holes can be drilled quickly to a depth of at least three metres in soils, asphalt and frozen ground. The auger can be set up, operated and stowed by two people in a matter of minutes. In the stowed position the auger is within the length and height envelope for transport on a C130 (Hercules) with no additional preparation;
- c. Hydraulic Power Tool System. The power to operate the hydraulic tools is common to the dozer and the auger. The tools are connected to 50 feet of twin pressure hose which is wrapped on a hose reel readily accessible at the top rear of the vehicle. The hydraulic tools consist of a chain saw, paving breaker and impact wrench (capable of wood boring). These tools have proven to be much more reliable than the gasoline powered saw and breaker currently employed by sappers and pioneers;
- d. Ramp Restraining System. Engineer crews have long been in the habit of using the ramp as a working platform. A restraining system has been designed so that the ramp door can now be safely used as a work platform capable of supporting 500 kilograms;
- e. External Fuel Tanks. Installation of external fuel tanks has increased internal stowage volume and improved battlefield survivability for the crew. In addition these fuel tanks provide ballast for swimming and replace existing counter weights positioned astride the rear ramp.

FUTURE PLANS

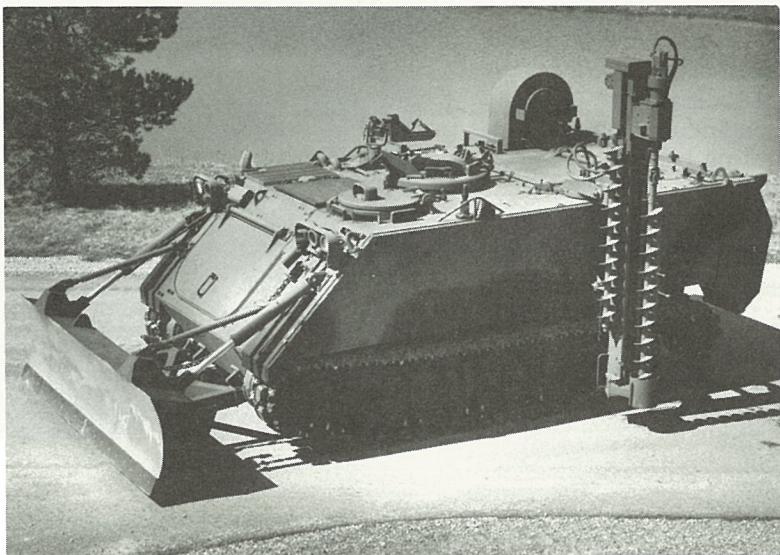
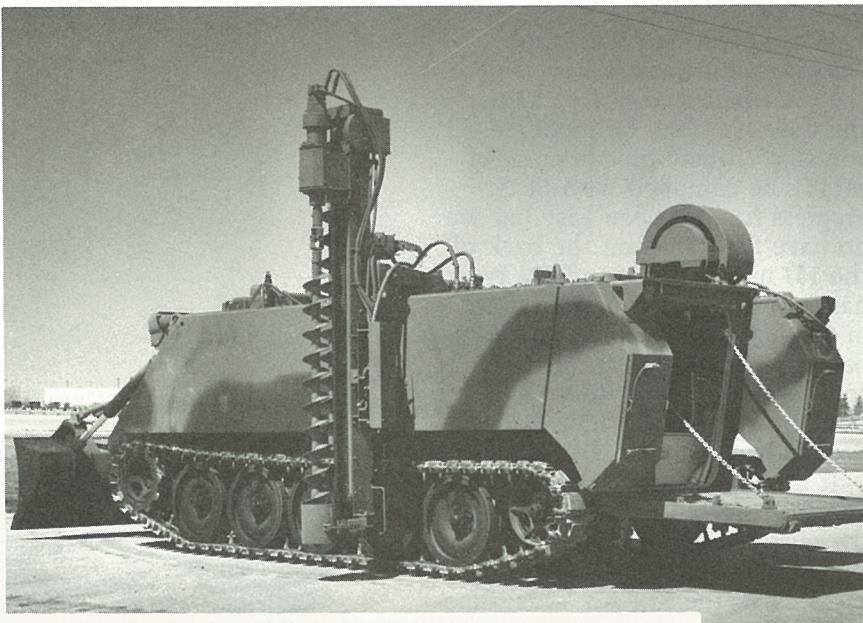
The prototype vehicle will be altered slightly as a result of

recommendations made in a recent LETE trial. The APC dozer fleet will be modified by civilian contract. The entire dozer fleet will be product improved (cooling, suspension, external fuel tanks) and provided with improved internal layout for personnel and stowage. A total of 47 APC dozers will be completely modified to the engineer/pioneer SEV configuration.

CONCLUSION

The M113A2 Dozer with Engineer/Pioneer equipment will enable sappers and pioneers to

function effectively under modern battlefield conditions. It is self sufficient engineering vehicle with greatly increased capabilities, based on the utilization of the APC dozer's existing hydraulic system to efficiently perform a wide range of engineering tasks. Reliability is built-in through a simple, functional and rugged design approach.



M113 EXTERNAL FUEL TANKS (EFT)

by E.C. O'Neill, P. Eng

US and Israeli experience, supported by extensive testing, showed that although the diesel fuel does not explode or ignite when a round goes through the M113 internal fuel tank, the fuel does feed the fire that in most cases starts when the spall from the left wall strikes the right wall. There is little doubt that it is in the best interest of the crew to move the fuel outside. The design of the EFT was completed by FMC Corporation and approved by the US Army in 1980.

When presented with the evidence of increased survivability the user requested in Dec 83 that the Canadian fleet be modified and that all new procurement of M113's be equipped with EFTs. Progress has not been easy but we do have fuel tanks on the back of the 137 new vehicles and 202 Wksp has started the first modification in Canada. One hundred new kits have been delivered from US sources and a former LEME officer, Gord Hovey, has the first Made in Canada contract for 220 kits.

It is obvious that the crews will like the idea but what will fuel on the outside mean to maintainers? We are not without some concerns. First, the EFT Kit adds some 410 kg (900 lbs) to the weight of the vehicle. This combined with .45m³ (16 ft³) more space for crews to carry essential tools of war means that the engine and power train will be working harder. Coolant and lube levels must be watched. We are also convinced that the fuel being outside the

heated vehicle will result in more cases of the Jack Frost Syndrome. The tee where the two feed lines join is also a one way valve for each line. It does not take much imagination to see the potential problem.

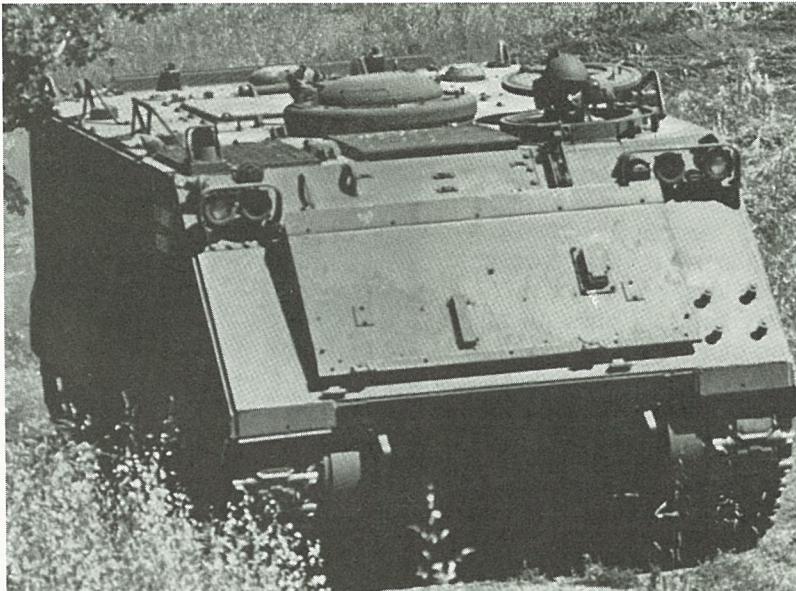
Don't forget both tanks feed and return at the same time and there are shut off valves on both tanks on both the feed and return lines. Therefore, in the event a fuel tank gets damaged, the feed and return line shut off valves to the damaged tank must be shut off.

Rear Mounted Fuel Tanks

- Improve survivability of crew and vehicle through reduced fire hazard
- Provide same level of ballistic protection
- Retain 95-gallon (360 liter) diesel fuel capacity
- Can be rapidly replaced in field if damaged
- Are identical and interchangeable
- Permit vehicle operation if one tank is damaged with automatic fuel control

Internal Stowage

- Increase internal stowage space (16 cubic feet)
A bonus, this additional space is available for ammunition, crew and related equipment.





IMPROVING AVGP

by M.D. Toronto

Now that the dust has begun to settle after the introduction of AVGP into service, there is time to assess the vehicle and ways to improve its performance, reliability and maintainability. The following is a brief outline of various projects having those aims.

One of the most persistent complaints about AVGP from the user has been its lack of cross country mobility when compared with tracked vehicles. A new, wider tire is being developed by Michelin in cooperation with Diesel Division General Motors (DDGM), the vehicle manufacturer, that may significantly improve this situation. Initially the tire was intended for future production vehicles requiring greater capacity, however the potential of this tire as a mobility enhancement for the AVGP and USMC LAV fleets was quickly recognized. The new tire is based on a 12.5R20 series tire modified to reduce diameter to meet current vehicle constraints while retaining the larger footprint. Although the main benefit of this tire is the anticipated increase in mobility, it may have the additional benefit of reduced sidewall damage due to heavier sidewall construction. DCMEM has initiated action to procure a set of tires for preliminary testing at LETE for verification vehicle compatibility and subjective assessment of mobility. Pending preliminary results, detailed evaluation is planned in early 1987. We will also be following with interest the results of a mobility study at Waterways Experimental Station at Vicksburg, Mississippi in which this tire will undergo rigorous evaluation.

The front suspension of AVGP, specifically the front shock, has been a continuing headache for vehicle maintainers. Not only does the original shock fail frequently but because of the McPherson strut style front end, it is time consuming to remove. An improved shock was introduced in March 1985 and should reduce the

number of failures in the long term as all old shocks are replaced. However, the new shock absorber is expensive and still requires excessive manhours to replace. Investigation has been initiated into adoption of a twin-externally mounted shock absorber system similar to that used on the USMC LAV to address these last two areas while maintaining a lower failure rate.

The Cougar turret possesses a number of areas which have scope for improvement. The most obvious is the gun and recoil

system. Routine maintenance of these includes a 250 EFC inspection and replacement of EFC lined components at various intervals ranging from 1500 to 4460 EFC. This coupled with routine corrective maintenance can keep a Regiment's weapons techs hopping. A tasking has been raised with DREV to develop modifications or improved components to reduce the overall maintenance requirement. Enquiries have also been made to other user nations of this turret in hopes of finding fresh



approaches to these problems. Developments in weapons takes time and no immediate relief is anticipated.

A second high maintenance item is the turret seats; the design is unnecessarily complex, not particularly robust and parts are both expensive and hard to get. An alternate seat has been developed by Alvis, the turret manufacturer,

and is currently undergoing user trials. There is one major drawback; the seats are prohibitively expensive at approximately \$4000.00 a copy. We are trying to bring down the cost by developing under contract a simple, rugged and inexpensive seat. Prototypes should be ready for trial in early 1987.

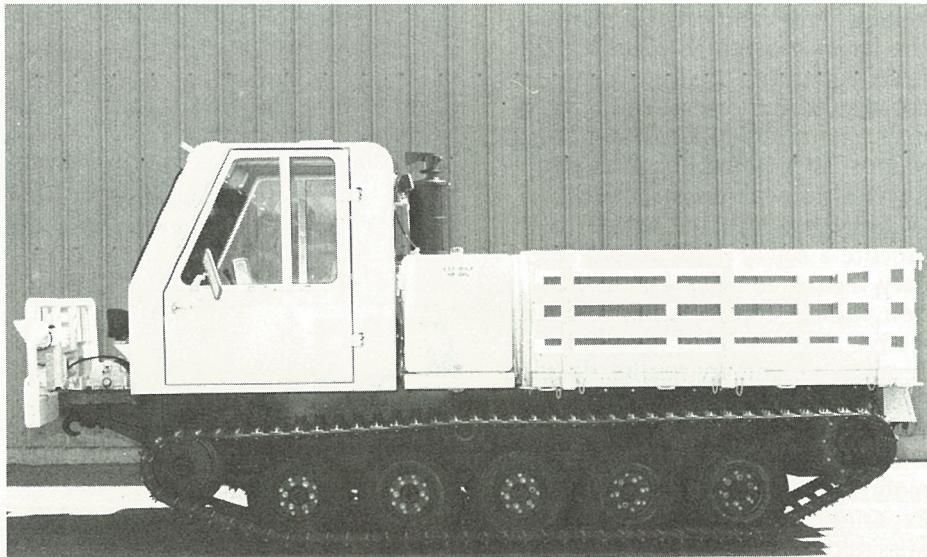
The projects briefly outlined

above plus others including Husky improved spades, Husky pneumatically controlled fast idle, black out brake light, drivers audible warning system, etc are all part of a continuing effort to make AVGP a better vehicle.

TF-20M AIRDROPPABLE MOSV

by J.G. Brunet, CET

The ten TF-20Ms, built by Bombardier Inc, have now replaced the CF-10 oversnow vehicles held by the Airborne Regiment at CFB Petawawa. The pre-production trial vehicle was successfully deployed on exercise Lightning Strike II in January 1986; and is worth noting that it was the only MOSV still functioning at end-ex. The test vehicle will rejoin the fleet upon completion of engineering trials at LETE during autumn 1986. The TF-20M is intended for use as a medium range, all-terrain/all season support vehicle for Airborne field operations including drop-zone clearance, movement of stores and the towing of howitzers. Specifications and performance characteristics are contained in CFTO C-32-747-000/MA-000 — Data Summary.



SHOOTING FOR THE LOWEST ERROR RATE WITHIN LOMMIS MKII

With this scenario, control office staffs of EME workshops have had their battle lines drawn since 1979 and have over these few years conjured up half truths, poor penmanship and if all failed blamed their misfortune on the computer.

For those who have strived over these years to attain the lowest rate by making the least errors are to be commended for their efforts. It is these efforts which not only protect the integrity of the data but provide the yardstick for management and OSMER teams as well.

It was decided that recognition should be given to those who have provided their units with low error rates. It is hoped that this concept will provide incentive for the higher error units to match or better the error rates, while providing a "good show" to the low error units.

The method of giving recognition to units providing the most accurate input data was quite an undertaking and to be fair it was decided to form three distinct groups. These are:

- a. units submitting 3000 or more workorders annually;
 - b. units submitting 500-3000 work orders annually; and
 - c. units submitting 0-500 work orders annually.
- With this in mind and to provide formal recognition of units that strive for perfection, the results for 1987 calendar years are as follows:
- a. the unit with more than 3000 submissions and the lowest error rate is:
 - (1) the winner is CFB Edmonton with 4635 submissions and a .9% error rate;
 - (2) the runner-up is CFB Borden with 7967 submissions and a 1.5% error rate; and
 - (3) honourable mention to CFB Lahr with 5801 and CFB Ottawa with 4648 submissions both at 1.6% error rate;
 - b. missions and a 0% error rate;
 - (2) the runner-up is CFB Cold Lake with 2751 submissions and a .7% error rate; and
 - (3) honourable mention to 1 CER Chilliwack with 806 submissions with 1.1% error rate; and
 - c. the unit with 0-500 submissions and the lowest error rate is:
 - (1) the winner is CFS Masset with 84 submissions and a 0% error rate;
 - (2) the runner-up is EC R22eR Valcartier with 30 submissions and a 0% error rate; and
 - (3) honourable mention to CFB Chilliwack, Vernon Det with 425 submissions and a .5% error rate.
- The unit with 500-3000 submissions and the lowest error rate is:
- (1) the winner is RCD Petawawa with 999 sub-

MINEFIELD BREACHING CAPABILITIES FOR THE LEOPARD MBT

by: Mr K.H. Ennis, P. Eng

Over the next two years the CF will procure minefield breaching rollers and ploughs for the Leopard C1 MBT. This article will

cover the rollers and a follow-up article on the ploughs will be published once the production contract is awarded.

GENERAL DESCRIPTION

The minefield breaching rollers are installed on the front of the Leopard MBT to detonate land

MINEFIELD BREACHING CAPABILITIES FOR THE LEOPARD MBT

mines in the path of the vehicle. A drag chain is suspended between the roller assemblies to detonate tilt-rod fused mines that lie between the paths cleared by the rollers. The equipment includes three groups; a roller set, an adapter set and a first echelon maintenance kit.

ROLLER SET

- a. The roller set includes a left side pushbeam/roller assembly, a right side pushbeam/roller assembly and a dog bone and chain assembly.
- b. Each pushbeam/roller includes a trunion assembly and four connecting chains that couple the roller bank assembly to the pusharm. Each pushbeam/roller assembly also includes a suspension cable assembly that prevents the front of the pushbeam from dropping into holes and impeding the tank's progress.
- c. A dog bone and chain assembly is suspended between the roller assemblies to detonate tilt-rod fused mines that lie between the paths cleared by the rollers.

ADAPTER SET

- a. The adapter set provides the means to mount the roller set to the Leopard tank. The adapter set includes: an adapter, control box and disconnect electrical harness.
- b. The adapter is fastened to the tank by pins through the towing eyes on the tank glacis plate and is tightened by four tightening screws. Four brackets on the bottom

of adapter accept the ends of the pushbeam/roller assemblies and two pyrotechnic assemblies by connecting rods and provide for quickly disconnecting the roller set from the adapter set. The wiring harness connects the pyrotechnic assemblies to vehicle power through a connector in the tank's hull. The control box regulates the activation of the quick disconnect system from the driver's compartment. The system also provides for a manual quick-disconnect.

FIRST ECHELON MAINTENANCE KIT

The first echelon maintenance kit contains a supply of frequently used repair parts, one assembly/operating special tool and storage space for the control box and

disconnect electrical harness.

Twelve sets of rollers and being procured from Urdan Industries Limited, Natanya, Israel. Deliveries will be completed by end 1986.

An interface modification for the Leopard C1 MBT is being developed under contract with Krauss-Maffei of Munich, Germany which will permit the electrical disconnect signal passage through the hull via a ballistically protected connector on the front of the tank just to the right of the driver's station (as viewed from in front of the tank). The interface modification also provides connection for the mine plough system and in addition will permit the dozer kit power and control cable to be connected to the driver's station through the hull as opposed to through a vision block port as called for by the present configuration.





LEOPARD C1 FIRE SUPPRESSION SYSTEM

The Leopard C1 tank crew compartment includes the gun control system hydraulic reservoir and lines, diesel fuel lines to the crew heater, stowed main and secondary armament ammunition, grenades, flares and secondary items such as clothing and electrical wiring. The extreme fire hazard posed by this environment during combat can result in as much as 50% of tank losses being directly attributed to fires. As a result, the Leopard C1 tank requires a system able to instantly detect and extinguish fires and suppress explosions in the crew compartment. The ARV and AVLB also have large hydraulic systems to drive the boom and bridge launching mechanism respectively, and require a crew compartment fire suppression system.

This operational requirement will be met by the Spectronix, Ltd "SAFE" fire suppression system provided under contract from Valcom, Ltd of Guelph, Ontario. The SAFE system is capable of automatically extinguishing hydraulic fluid, vapour and fuel fires and explosions in 80 to 250 milliseconds, while also limiting the catastrophic effects of ammunition fires.

In order to accomplish these tasks the system is made up of optical fire detectors, a control box, alarm panel and four extinguishing cylinders, each containing Halon 1301. To minimize false alarms, the system has a normal or less sensitive mode, and a combat operational mode, hence, crews are unlikely to initiate bottle discharge during routine training while still being protected from fire.

All safety aspects were carefully considered during development. Halon 1301 is the safest gaseous extinguishing agent available. The concentrations achieved when two

bottles discharge are completely safe for healthy adults to inhale for up to 15 minutes. The high pressure cylinder comes fitted with an anti-recoil device which prevents the cylinder from acting like a rocket if accidentally discharged. The valve which releases the gas is activated by an electric squib. The squib is a Class C explosive and contains a small charge. It is installed in the Halon cylinder by the manufacturer and is to be removed, handled and installed only by a qualified Ammo Tech. The Halon cylinder with squib is to be treated as a class C explosive for packaging,

shipping, handling and storage. When the cylinder is not mounted inside the vehicle, the electrical connector must be protected by the shunt cap.

The new Leopard family Fire Suppression System will be completely installed by Feb 87. It is a well proven system which easily integrates into a vehicle. As a survivability enhancement it makes the crew less vulnerable to fire, while improving their confidence and satisfaction with the vehicle. It is easy to maintain, has built in test equipment and is repaired by component replacement.

